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A SYMPOSIUM

ON THE VALUE OF HUMANISTIC, PARTICULARLY CLASSICAL, STUDIES AS A PREPARATION FOR THE STUDY OF MEDICINE AND OF ENGINEERING, FROM THE POINT OF VIEW OF THE PROFESSIONS[1]

I. THE VALUE OF GREEK AND LATIN TO THE MEDICAL STUDENT

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Mr. Chairman and Gentlemen:

The disciplinary value of the study of the classics has been generally recognized by educators for hundreds of years, and it is no less today than it was a generation ago. All teachers agree that there is no royal road to knowledge, and this sentiment has been attested by such axiomatic phrases as, *non palma sine pulvere, ad astra per aspera*, etc., which all have approved and none denied since the time of Cicero and Sallust. *Nil sine magno vita labore dedit mortalibus*, "There is no excellence without great labor," is trite enough, but as true as trite; and now that we know more of the operations of the mental faculties than the best

[1] Part of the program of the Classical Conference at Ann Arbor, Mich., March 29, 1906. A similar symposium, on "The Value of Humanistic Studies as a Preparation for the Study of Law and of Theology," will form a part of the program of the next conference, in March, 1907.

Through the kind assistance of the Board of Regents of the University of Michigan and the courtesy of the publishers of the *School Review*, it has been possible to secure a number of reprints of this Symposium for distribution among teachers and students. Those desiring a copy may address (inclosing a two-cent stamp for postage): MR. LOUIS P. JOCELYN, Secretary Michigan Schoolmasters' Club, South Division Street, Ann Arbor, Michigan.

teachers of former generations knew, the truth of this old "saw" has been intensified to the *n*th power. No one can become a student of anything until he learns how to study, and he does this only under the whip of application. No knowledge, save that of the most superficial character, is easily acquired. Like gold, true knowledge lies beneath the surface, and he who would possess it must dig for it, and systematic education should begin in learning how to use the senses—the pick and shovel, as it were, of the mind. The five senses are the only avenues through which we acquire knowledge, and even the most brilliant pictures of our imaginations are but perceptions previously acquired through the senses, and subsequently rearranged and projected onto the sensitive retina of mental vision. Although we cannot define mind, we know something of its *modus operandi*. We know that the pyramidal cells of the cortex of the brain must be brought into relation with the non-ego; that this connection can be made only through the nervous mechanism of the special senses, and that this machinery does fine and effective work only when nicely adjusted under the guidance of long experience. Like the gastric cells, the pyramidal cells of the brain atrophy with disuse, as happens when fed upon predigested food; and if I may express an opinion here parenthetically, I will state that too much of this kind of pabulum is dealt out to the young in both our secondary and higher institutions of learning. There has been found nowhere a better training for the thinking apparatus of the young than the study of Latin and Greek. The great number and variety in the inflections of noun and verb render close attention an absolute necessity, and this, in and of itself, is of the greatest value in an educational way. Carelessness and superficiality are incompatible with any thorough study of Greek and Latin. Besides, with the close attention that the student must give to the variations in the structure of words, he soon begins to perceive that these indicate variations in the shade of meaning, and then the joy of study takes possession of the student. His observation is sharpened, his perception becomes more delicate, and he finds increased pleasure in the intensity with which he seeks fully and correctly to interpret the author's meaning. And this habit of close observation, of attention to detail, of looking for fine distinctions and shades of difference, and the alertness of mind possessed by an individual of this habit, will be of inestimable service to him, should he choose medicine for his profession,

both in his experimental work in the laboratory and at the bedside of his patient. This point in favor of the study of Greek and Latin, it seems to me, is not easily overestimated. Indeed, the progress of medicine is determined largely by the accuracy and precision with which observations are made. The careless or the superficial man is not suited either to the practice of medicine or to the conduct of experiments for the elucidation of medical problems. It is the painter who brings out detail, and not the impressionist, who is needed in scientific medicine. The best medical schools are rapidly advancing their requirements for admission, and now demand from two to four years of collegiate work, while the academic faculties are filling these two to four years largely with loosely regulated electives; and I am by no means certain that in fact the medical student of today has a better preparation for his professional study than his prototype of fifty or more years ago. William Harvey, whose keenness and accuracy of observation led to the discovery of the circulation of the blood, after many years devoted to the classics, gave five to the study of medicine, and his fitness was proved by his work.

The direct value of Greek and Latin, especially of the former, as aids to the exact meaning of medical terms, as shown by their derivations, is disputed by no one. But some do claim that the giving of from four to six years, or even more, to the digging of Greek roots and the trimming of Latin stems is too big a price to pay for the result, however valuable it may be; and possibly this is right, if the student gets nothing but a knowledge of etymology from his classical studies, and if the time and energy given to the classics are so excessive that he cannot seek knowledge in other fields. The education that best fits one for the study of medicine certainly should not be narrow, and I would not have the preliminary training of the prospective medical man confined to Greek and Latin, nor would I give to the classics an undue share of time and energy. But when, in addressing my medical students, I use a new term—for instance, when I speak of a "toxicogenic bacillus" or a "pathonogmonic symptom"—I can easily distinguish the students who have a fundamental knowledge of Greek from those to whom this basic language—certainly basic so far as medical terms are concerned—is indeed a dead language. Years of frequent and careful consultation of the dictionary may make good this plainly evident deficiency, which, however, does not exist for the student who

has been drilled in Greek in his preliminary education. Medicine is, now at least, a rapidly progressive science, and even the dictionaries do not keep pace with its advancement. It not infrequently happens that an earnest medical student comes to me with the statement that he cannot find a certain word—"galactotoxismus," for instance—in his dictionary. If such a student had had a fundamental training in Greek, he would not have needed to consult a dictionary in order to ascertain the meaning of this word. Besides, I am of the opinion that the best dictionary, frequently consulted, cannot give to one wholly ignorant of Greek the correct, clear, and full appreciation of the meaning of such a word as "sitotoxismus" as comes unsought to the one versed in Greek. Of the two languages, Greek is of much more value than Latin as an aid in the comprehension of medical terms; and it seems to me regrettable that at least two years of good, solid work in Greek cannot be demanded as an unconditional requirement for admission to our medical schools.

It has been said that the use of Latin names in medicine, and especially in the writing of prescriptions, is pure affectation and should be discontinued. This statement is wholly erroneous and could be made only by one grossly ignorant of the facts. The word "salt" may mean any one of a thousand compounds, but "sodii chloridum" and "magnesii sulphas" are definite and signify definite compounds, and are capable of only one interpretation, be the reader English, French, German, Russian, Italian, or Spanish. For the purpose of designating a certain plant, or the extract of a certain plant, the common name cannot be used, because it may not be the same even in different sections of the same country, while the scientific or Latin designation is the same the world over. The language employed by an exact science, like chemistry or bacteriology, must be one which has already crystallized, and not one which means one thing today and may have quite another meaning a year from now, or even a century in the future. We must not forget, even in the pursuit of the rapidly growing modern sciences, that there is also a science language, and that it, like everything else mundane, comes into existence, goes through a process of evolution, suffers modifications from its environment, and does not crystallize into exactness until it is no longer used orally; and not until this final period is reached, and it is no longer subject to

material modification, does it become the suitable form for exact, scientific expression.

I have given thus briefly and imperfectly some of the reasons of a practical character as to the value of Greek and Latin to the prospective medical student. There is much more that might be said. The boy who has not studied these languages has missed the full and satisfying pleasure that comes to him who reads in the original the wonderful epic of Homer and the stately lines of Virgil, has caught the full force of the eloquence of Demosthenes and of Cicero, has had a bout with Horace and helped Cæsar build his wonderful bridge; and *mirabile dictu*, I believe that the boy who has had the wider view given by a study of the classics will be all the stronger in both experimental and practical medicine on account of the knowledge and wisdom gained from the wise men of Greece and Rome.

II. DISCUSSION OF DR. VAUGHAN'S PAPER

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Mr. Chairman, Ladies and Gentlemen:

I esteem it a privilege to address this assembly for any cause, but chiefly, I confess, because it lies in your province, and you have the power, to do what I hope will be done in the near future—restore the study of Greek to a proper position, so far as my profession is concerned.

You cannot discuss a paper without disagreeing with the statements contained in that paper. Now, I do not disagree with Dr. Vaughan, in the slightest particular. As a teacher of medicine who has been working at it for thirty-seven years, I surely ought to be able to appreciate the importance of what Dr. Vaughan has said. While I cannot say anything in addition, I wish to lend my support and give as much emphasis as possible to each of his contentions; for an additional favorable opinion in any controversy adds to the weight of the arguments adduced and to the strength of the position taken. I have this matter very much at heart, which is indeed my only excuse for addressing you. The medical profession is not only employing Greek and Latin terms, using them at all times, but it is also coining them, and often doing so very incorrectly. The way Latin beginnings have tacked on to them Greek endings has come to be an abomination. Such illiteracy is making a laughing-stock of the profession in the opinion of men of the most ordinary culture.

But there is something worse than that. It is surely breaking one of the first

rules of pedagogy to try to convey information concerning abstruse subjects to those who have never heard anything resembling these new studies, in a technical language that they cannot understand—in an unknown tongue, as it were. This is just what we do, and, as Dr. Vaughan has said, how many thousands of times, as I look at the faces of my students, do I see a puzzled look or wrinkled forehead, because they do not understand the meaning of the technical terms I am employing, and which I must stop to explain! It is not my business to teach the meaning of ordinary technical terms. I should be able to use any technical term that I see fit to illustrate the subject, and the student should, if reasonably conversant with Greek and Latin, after a little reflection be able to understand it. I can hardly recall a technical term that as a student I had to look up in the dictionary. Thus, lack of knowledge of the dead languages proves a serious interference to teaching medicine, because we compel the student to learn a language composed of meaningless terms with which to acquire knowledge of entirely new subjects—subjects to which he should devote all his energies. This is bad enough; but what is still worse is, that those who have never studied Latin or Greek very rarely take the trouble to consult the dictionary to ascertain the meanings of scientific terms. They may ask their neighbor what one means, when he probably knows less than they; and so they go through their medical curriculum and through their life not understanding, or actually misunderstanding, what certain terms mean. I find, when I am examining students, that they often do not know the meaning of the technical terms they are employing. In giving the history of a case they use terms that convey the opposite meaning to the one which is intended to be conveyed.

III. THE VALUE OF HUMANISTIC STUDIES AS A PREPARATION FOR THE STUDY OF MEDICINE

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All knowledge has, of course, value; but not to any single individual. In its distribution throughout the world there are appreciative and utilizing persons, who, by each appropriating different parts, render it all profitable. How profitable a certain branch may be to one depends upon many different things, some of which are, how much it will benefit him in his station as a self-reliant worker for a living, as a member of society, as a citizen, as a person with or without an appreciation of it. Again, granting that a particular kind of knowledge has value to a certain individual, the question arises whether some other kind, or more of another kind, might not make him more

efficient. His efficiency depends upon adjustability to his special vocation, which, in turn, is based upon a preliminary or preparatory training. The student who has educational qualifications or accomplishments, aside from those which have a necessary bearing upon his chosen profession, is the best prepared, not only for life, but, to use a biological term, for his specialization. He should be so prepared as not to become an intellectual malformation, but a well-balanced man. If a liberal preparation includes the humanities, then of course their importance is conceded. On this point there is probably a decided difference of opinion, and to discuss it leads to disputation. If the humanities are not essential, except in so far as they may have a few so-called practical bearings upon a professional education, they must be assigned to the optional class. There are those whose views upon the subject, if their reasoning be carried to the ultimate conclusions, must lead them to think that the preparation for medicine should begin in the kindergarten. On the other hand, others do not consider that there ought to be any particular difference in the elementary preparation of students for all the professions; they think that the foundation for a liberal education is the foundation for a professional education. The views of this class must lead ultimately to the conclusion that, if, when the student begins to specialize in medicine, he has not acquired sufficient special knowledge to enable him to round out a thorough training in the ordinary four years, the course should be lengthened, either by a preliminary year for special foundation work, or by an introductory course to the main subjects as they are taken up in routine.

Some seem to maintain that this is particularly a transitional age in the adjustments of studies; that, after a while, we shall get matters "fixed." The fact is, all ages are transitional. Adjustment by virtue of human progress blends into or out of non-adjustment. There is no such thing as fixation. At the present time, as the affairs of the world are going, the ordinary physician, like the average lawyer, teacher, journalist, and clergyman, does not care for education as an accomplishment. He recoils from severe training and hard reading. His ideal is the ordinary routine business success. This state of affairs must be tolerated so long as the student considers life a failure if he cannot graduate at an early age regardless of preparation; or while the leading question is: "What are the minimum requirements of the

law and the curriculum?" "How is such or such a study going to help me to be a doctor?" is the commonest inquiry from the ordinary medical student.

The learned physician recoils from the thought of Professor James's description of the uneducated person. He abhors being "nonplussed by all but the most habitual situations." He wishes to have his resources so organized and powers of conduct so great as to fit him with as perfect relations as possible to his social and physical world. He works to be as well prepared as possible, to educate himself "by means of the examples with which his memory is stored, and of the abstract conceptions which he has acquired from circumstances in which he never was placed before."

The physician should have special, exact, and ample knowledge of the many scientific branches that constitute what is generally summed up in the term "medicine." These branches he should comprehend in their interdependences and true and broad relations, pursuing them with a sanctified devotion. There is no branch of learning which may not materially contribute to such a grasp of his subject. While he cannot read or study everything indiscriminately, he will have an elective affinity for some subject or subjects in the broad field of knowledge that he will make conducive to his peculiar needs, although he may not be able to explain just how or why. He should know the virtues, vices, and needs of those who make up his social environment, and appreciate the claims that neighbor, community, and state have upon him. To be a wise citizen, he should have a historical and present knowledge of the political institutions by which he is governed. The humanities have here special importance, if he is interested in a historical study of the duties of citizenship. The physician must have a penetrating insight into human nature; not humanity as a mass, but a scrutinizing, differentiating, penetrable gaze into individuals that reveals to his trained perceptions the reasons for the one under observation being mentally, morally, and physically different from everybody else. The educated physician is larger than his profession and wider than his allotted space in the community.

He does not consider that the pre-medical branches he studied in school are to be laid aside. With him, preparation and specialization go on hand in hand. As the superstructure is to be enlarged, the

foundations must be extended. If the building advances in a particular direction, in that same direction must the preparatory or substructure expand. If he aspires to be an author, language and the powers of expression must be studied. If he delights in bibliography and lore of the profession, then linguistics must be carried along. If he mingles with educated people, from necessity, he must have the faculty of appreciation and the powers of address. If he would be looked upon, as were the doctors of a century or so ago, as the learned man of the community, he must keep ahead of his devotees. For his recreation and self-entertainment, he is entitled to give his tastes a wide range, but should avoid permitting his indulgence in this respect becoming a dissipation. No man is up to the full degree of professional efficiency who permits his leisure to be frittered away by unprofitable recreation. Even recreation has character and, be it ever so relaxing, should be graced by dignity. Literature, art, music, brilliant associations, politics, languages, poetry, a side branch in science, biography, the "humanities," all have their recreative and great cultural value.

While I have referred to these subjects as recreations, they cannot fail to have a reactive benefit upon strictly professional work, and to be contributory to one's acumen in handling and interpreting people, even in estimating their modalities in regard to the administration of remedies. In some of these subjects, physicians, aside from being foremost in their specialties, have attained distinction. William Harvey was one of the best mathematicians of his day. Daniel G. Brinton was perhaps the best qualified man of his time upon the subject of American archæology. O. W. Holmes, while he maintained his position as professor in a medical college, gained vastly more distinction as a literary man than as a doctor. The late Timothy F. Allen, one of New York's leading physicians, became a noted botanist and was regarded as the best American authority upon the *Characea*. Virchow was learned in statesmanship. Metchnikoff declares that, aside from what is ordinarily referred to as biological sciences, folklore, philosophy, religion, language, and poetry of all races and stages of culture must be studied in order to comprehend the real physical and physiological properties of man.

Probably the most conspicuous living example of the physician who combines literary pursuits with his scientific work is Dr. Osler. He

takes wide excursions into the domain of the classics, and draws freely for his illustrations upon ancient literature, history, and biography. Still he writes that the biological studies give to a man clearer points of view and an attitude of mind more servicable in a working-day world than other sciences, or even the humanities. Scholastic studies are not incompatible with ample professional qualifications.

Just now there is an awakening to an interest in historical medicine. Six medical colleges in the United States (Yale, Chicago, Johns Hopkins, Maryland, Buffalo, Minnesota) have courses in medical history. Original records, manuscripts, inscriptions, and even excavations are being ransacked for mines of neglected and overlooked discoveries. Besides, the relations that existed between the doctors of medicine and the Pope and the clergy, the governors and the people, are being studied in the original languages. Even the old Hebrew writings and Egyptian inscriptions are subjected to investigation from the physician's standpoint.

Before a young man enters upon the study of medicine, the law, as well as the college course, requires that he have a specified degree of attainment in certain branches. These are regarded as essential to a comprehension of the fundamentals of the subject. What values are to be placed upon different branches has caused much discussion and disagreement, but the average high-school course is now agreed upon as a minimum. Some maintain that certain studies are the all-essential; others that a mind trained to continuity of thought and the capacity of independent reasoning from facts and data to rational conclusions is sufficient, and favor giving the student a wide choice of election.

According to an old system, the physician classified his people by temperaments; a method not without merit. There is the nervous temperament, the phlegmatic temperament, the sanguinous temperament, and so on. In a similar way students may be grouped in regard to their tastes. One has a predilection for languages, one for mathematics, others for literature, and some for the classics; and so through the list. From their earliest school days they frequently manifest these preferences, which may be developed into delightful accomplishments and carried along with routine work.

By the fixed-rule system, only such language, mathematics, history, and natural science are measured out to the pupil as it is thought he

should know so as to enter understandingly upon medical branches. According to the other theory, even if he be deficient a count or two in trigonometry, for instance, he may be ahead of the average in Latin, Greek, English, elementary psychology, or some other disciplinary branch, so as to comply with an elastic standard.

Of course, it is appreciated that so long as the high school is the gateway for the ordinary student to a medical course, there is not so much hope of his becoming liberally educated as there will be when the academic college courses are added to the list of entrance requirements. However, if with nothing but a high-school training a student of the intellectual diathesis starts out in medicine, he will, with a little latitude for his tastes, round out to a high degree of scholarly attainments.

The student who has the elective privilege and selects only easy courses will probably never make a scholar unless, perchance, he experiences the quickening influence that occasionally comes from contact with an inspiring teacher. In his choice of studies he betrays his instinct and gives evidence as to whether he had better or had better not be urged to take what is usually referred to as advanced work. The student with the scholarly predisposition and a taste for the humanistic studies should be encouraged to pursue them. If, on the other hand, his taste incline him strongly in another direction, why not let him gravitate that way? But there is danger at this point of his being prejudiced by some scientific enthusiast who does not himself comprehend the importance of any group of studies besides those which he has himself too narrowly pursued.

If I may be allowed to presume that there is anything conclusive about what I have said, I will make the following summarization:

1. A preparation for medicine is not particularly unlike preparation for any other specialized work. It contemplates the training of the faculties and acquisition of classified knowledge.

2. The average graduate, at the present time, will enter the practice of medicine as a business project, and will not strive for lofty educational ideals.

3. The ideal physician will appreciate the value of all knowledge and delight to become proficient in such intellectual activities as he may be led to by a refined taste.

4. So soon as practicable, advanced or collegiate work should be required for admission to medical college.

5. In the advanced studies a wide latitude should be permitted to the conscientious student, that he may cultivate his preferred branches.

6. As the humanistics, such as the classics, philosophy, history, the arts of reasoning, and so forth, have great cultural and disciplinary value, students should be encouraged to pursue them as a historic background against which the present appears.

7. The greatest merit of these studies is not to be sought in their technical values, although a knowledge of Latin and Greek is time-saving in the etymological translation of words and phrases, and facilitates the learning of modern languages; but in that they conduce to a better interpretation of literature, both medical and general, in a broader sense, and are of great refining worth.

IV. THE VALUE OF THE HUMANISTIC STUDIES AS A PREPARATION FOR THE STUDY OF ENGINEERING

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The subject of the technical training of engineers is one that has been treated at some length by many writers within the last decade. In the majority of cases, however, little or no attention has been paid to the earlier or preparatory education of those intending to follow this profession.

The engineering profession naturally demands a training along highly specialized lines, and the consideration of this fact has to a certain extent overshadowed that of the purely preparatory, or what may be called the general education, which must form a basis for this specialization.

In the engineering departments—and, it must also be confessed, in the departments of literature, science, and the arts—of our universities the utilitarian spirit has of late assumed a somewhat prominent place; and, in the endeavor to devote his time solely to those subjects which he considers will be useful or money-producing immediately after graduation, the student in all probability will omit those studies which

are of the nature of general culture. The time which the average man can spend at the university being limited to four years, and in the case of most modern engineering courses four years at a considerable pressure, the demands of the purely technical studies, or those bearing immediately upon the same, have rendered the introduction of any culture studies an impossibility. This is due to the fact that, owing to the recent developments within the sphere of science, there is so much more to teach in the old subjects, so much that the students ought to know about the new, that four years is all too short even for the technical work.

With this atmosphere pervading the educational world, it is not very surprising that the student, in deciding upon the selection of certain courses, will ask himself: "Is this particular study going to be *useful to me?*" In his somewhat immature judgment he is apt to lay greatest stress upon those subjects which he imagines may be converted most easily into cash in the immediate future, losing sight of the fact that there may be other things in life besides the mere accumulation of wealth or expertness in his profession.

It may be pertinent at this time to consider the position of the engineer in the economic and social world of today. In the early days of the profession the only representative was the military engineer; but, as time went on, operations other than those of a military or semi-military character demanded men whose training was not necessarily along military lines. Hence arose the term "civil engineer" as applying to those non-military men engaged in engineering in a general sense. The advent of steam and machinery led to a new class, known latterly as "mechanical engineers," this term being used to distinguish the men who specialized in moving machinery rather than in statical structures. In these later days the name of the various classes of engineers is legion, but it is necessary here to emphasize the second main division of the engineering profession, as in the early days it led to the introduction of a class of men entirely different from the civil engineers. Even at the present day many are apt to couple the term "engineer" with machinery, and its accompanying adjuncts of overalls, grease, and grime.

In the early days before the development of engineering as a science, the only method of obtaining knowledge of machinery was by close

and intimate contact with it. Engineering courses at universities were unknown, and those who took up this profession—or, more strictly speaking, trade—were in the majority of cases men of somewhat limited attainments, so far as general education or culture was concerned. As time went on, and engineering problems began to attract the attention of scientific men, the methods of the profession began to change. The old "rule of thumb" gave place to scientific method, and the demand for men with a thorough grounding in science—or, in other words, educated men—increased. The reason was not far to seek. New problems were arising continually and these required something more than mere practical experience in their solution. Twenty years ago the employer looked askance upon the graduate of a university or technical school; today the majority of large concerns will employ no one unless he is a graduate. A remark made recently by the manager of one of these may perhaps be of interest as showing his complete change of front; he said, in speaking of the work that a university should endeavor to accomplish: "*You* give them the grounding and theory; *we* can give them practice." So far, then, as the profession in itself is concerned, there is at the present day a demand for educated men.

The modern engineer occupies, in many respects, a unique position. In practically all enterprises affecting the public at large either the responsibility is thrown directly upon the engineer, or at least his aid is required partially; in fact, he is reponsible for nearly all those operations which involve the outlay of large sums of money. As compared with his professional brethren in law, medicine, or divinity, he may be said to be in a position of trust to the community at large rather than to the individual.

He is, therefore, brought into contact with all sorts and conditions of society, and must meet men of all professions or trades, not necessarily in a business way only, but also privately or socially. If statistics could be obtained from prominent engineers of today, I have no doubt it would be discovered that the impulse which gave them their early start was due as much to the help of some influential friend as to their own native ability. The faculty of being able to "get on" with everybody (to use an everyday expression) means more to the engineer than many realize.

These considerations, apart from proficiency in his profession, which, as was seen above, demands an educated man, tend to emphasize the fact that he should also be a cultured man; that is to say, a man with some interests outside his own profession, or at any rate one with sufficient training in what may be called the culture studies to appreciate what is being done in professions other than his own.

The above discussion of the position of the engineer in the world of today, although necessarily fragmentary, will perhaps be of assistance in appreciating the arguments which will follow.

There are certain preparatory subjects which may be regarded as common to all professions, but their relative importance may be greater in some than in others. The study of a so-called culture subject may be useful in fulfilling two objects: first, for the knowledge of the subject *per se*, or as an introduction or basis to others; and, secondly, as a general training for the mind.

So far as the profession of engineering is concerned, at least under the existing conditions, the second may be said to have the greater weight; although the importance of the first cannot be overlooked.

While not an exact science, the study of engineering demands definiteness and conciseness of thought, and one of the chief difficulties that those connected with the education of engineers have to overcome is a tendency to generalization on the part of the student.

An analytic, in preference to a philosophic mind is the type that should be cultivated. In order to be successful, the student should have formed the habit of co-ordination and exactness in his earlier years of study.

While it may be the opinion of many that the introduction of some elementary form of science may accomplish this result, I venture to suggest that, as a general rule, studies of this nature will have an effect diametrically opposite, and lead toward vagueness rather than concreteness. What, for example, can be done in a subject such as physiology, when it is taught, not for the science itself, but under the influence, and as a means of propagation, of certain ideas of a serious but somewhat misguided body of women? The time so spent would be far more beneficial, both for a general training of the mind as well as for forming a basis to further studies, if devoted to the humanities.

As a means of inculcating ideas of exactness the study of the humanities is *facile princeps*. The niceties of translation, the importance of gender, number, and case, the proper use of the moods and tenses, and the demands of the relative clause, compel the mind toward a certain definiteness which is lacking in many of the subjects taught in the early stages of education. The most simple translation, or even the study of the grammar of these subjects, demands a directness of attention and a consideration of detail which cannot be otherwise than beneficial to a student whose work in the future will lead him into subjects where generalization is impossible.

As a direct preparation for many studies now required in the engineering curriculum, the humanities also play an important part. In the majority of engineering schools of the present day the first two years are devoted mainly to non-technical subjects, such as preliminary mathematics, English, and modern languages. The benefit of the study of the humanities as a preparation for modern languages is too well known to need discussion at this time. A word, however, may be said regarding the study of English. Few perhaps realize the amount of writing that an engineer has to do, especially if his work is of a consulting character. He is required to report upon numerous schemes; he is often asked to give his opinions relative to the probable success or failure of certain undertakings; and in many cases his evidence in law courts is the ruling factor of the decision. These, together with the preparation of specifications and contracts, demand a familiarity with the English language which, it must be confessed, is often lacking.

While the cultivation of an elegant and literary style is neither demanded nor desired, it is, however, necessary that the engineer should be able to express his ideas concisely, and with at least a certain amount of regard to the common usages of decent English.

It is an everyday experience that the origin of most lawsuits in engineering, especially in cases of interpretation of a specification or in patent suits, may be traceable directly to some idea loosely or inadequately expressed. The English speech, which one of our modern writers has aptly characterized as "the sea that receives tributaries from every region under heaven," requires a background of training in the humanities, at least for a full appreciation of sentence structure, if not for the benefit derived from the study of the grammar of these subjects.

It may be pertinent here to call attention to the amount of time spent upon, and the methods of teaching, English grammar in most of our public schools. The idiosyncrasies of the preposition and the conjunction, the use of the comma and semicolon, and many other details throughout the whole domain of English, are learned by rote; and the ease with which some children can reel off pages of rules, without the slightest idea of their meaning or application, is at once a source of wonder and pity.

I venture to suggest that, if half the time at present devoted to this kind of study of English were spent upon Latin, the net result both from an educational and mind-training point of view could not be otherwise than beneficial.

As a matter of fact, most children begin the study of languages far too late in their curriculum, and there is no reason why Latin, and perhaps French, should not be begun in the grade schools. So much of the earlier part of a language must necessarily be learned by rote that it seems hard to realize why these studies have not been introduced in preference to some of the somewhat useless and inadequate frills so often found in many of our schools. Both in England and Germany, Latin and French are begun at a much earlier time than here—generally between the ages of eight and ten; and, what may seem peculiar, no other studies are neglected to make way for these.

Although the above discussion may be considered as somewhat beyond the scope of the present paper, yet, when the previous arguments are taken into account, I trust I may be permitted this digression.

In connection with the study of the humanities as a preparation for an engineering education, the question as to the length of time that should be devoted to these will naturally arise. The work at present required of engineering students, in the general four-year course, leaves practically no time for elective studies; and even if time were available, it is an open question whether this should be devoted to the further study of humanities or not, especially as in any case it would not amount to a sufficient number of college hours to prove beneficial. In the years immediately preceding the university—that is to say, throughout the high-school course—the study of the classics is certainly most desirable. At present the engineering department of this

university accepts only two years of Latin for entrance requirements; but in all probability these conditions will be revised in the future.[1]

If the languages could be begun in the grade schools, then perhaps three years of classics in the high schools would prove sufficient for most cases. The last year could then be devoted to those subjects—such as chemistry, physics, and modern languages—which would cover the other entrance requirements. After all, the object of a university entrance examination is simply to show that the student has a moderately well-trained mind; and I venture to suggest that one who has devoted his time to the study of the humanities will be in as good a condition to absorb the university work as one who has spent his time in getting a smattering of a number of subjects, some of which are practically useless.

It may be interesting to notice that, on the average over the past three years, 49 per cent. of the total number of entrance languages presented by candidates for admission to our engineering department were Latin, about 37 per cent. German, and 11 per cent. French, and the remainder a small fraction of Greek, Spanish, or no languages at all. Of these it is a little difficult to say, without looking up a mass of certificates, how many students had more than two years of Latin; but the presumption is that the majority did not have more than this amount. While two years of a language such as Latin is certainly better than none at all, it is doubtful if a student has any particular grasp of the subject in so short a time.

The difficulties attendant upon the somewhat crowded conditions of work in the regular four-year course, as well as the demand for men with a somewhat broader education, have led the engineering faculty of this institution to consider the advisability of arranging a six-year combined literary and engineering course.

As, however, the technical work has been revised and rearranged during the past year—and this in itself has entailed a considerable amount of change—the committeee in charge of the proposed course deemed it wise to see how this new scheme worked before reporting upon any further possibilities of extension. In a general way it may be said that the work in the literary department will be chosen so as to

[1] Since the reading of this paper, the Engineering Department of the University of Michigan has decided to accept two, three, or four years of Latin. Greek is also accepted for entrance.

give the student a good general course—with perhaps a few electives, but not many. It is the desire of the department to give the student a broader education, especially on the culture side.

With this in view, it is hardly necessary to point out the advisability of the study of the classics in the high-school grades. Even with a six-year course, provided that a student had at least four years of Latin previously to his coming to the university, it is doubtful if there would be any particular advantage in the continuance of this line of study in his higher education.

While the writer is aware that many points in connection with the subject of this paper have remained unconsidered, or dwelt upon somewhat lightly, it was thought best to give a general survey of the conditions at present obtaining in the engineering profession, and to trust that some of the important details would come up in the discussion.

In conclusion, it may be said that it should be the desire and aim of everyone connected with the education of engineers to raise the standard of the average or rank and file of the profession, so that in the future it will not be a source of wonder and surprise when an engineer is discovered who has interests outside his profession, and who can appreciate art and literature for themselves alone.

V. DISCUSSION OF PROFESSOR SADLER'S PAPER

GARDNER S. WILLIAMS, C.E.,
Professor of Civil, Hydraulic, and Sanitary Engineering, University of Michigan

Mr. Chairman, Ladies and Gentlemen:

Engineering as a profession has come to a sudden popularity. At the present moment, taking it in all its branches, it may safely be called the most popular of the professions; and it also, from its traditions, is looked upon as a most practical profession. It was developed essentially as such, and those who simply look at it from the outside so regard it. That was its original characteristic, and it may be interesting to note that some of its early exponents felt that when they had completed their life, they had done all the engineering it was necessary for anyone to do.

It is related of Thomas Telford, one of those early civil engineers to whom Great Britain owes so many of her canals and roadways, that when a young man made application for the privilege of studying engineering under him, he replied

by asking what the applicant expected to find to do in the profession, saying: "I have built all the canals and all the roads that are necessary, and I do not see what there is left for you to accomplish." That was the view that a practicing engineer took of his profession in the first half of the nineteenth century. And even now, judging from its history and traditions, there is no profession that may more properly say: "Away with the culture study! Away with Greek and Latin! We do not need them." And there is no profession that has said it more frequently than has the profession of engineering. But there have been divers reasons for that. It was not wholly the engineer's fault. Our cultured friends must take a little of the blame upon themselves. They chose to look down upon the engineer; and, though quite justly, nevertheless the engineer objected to being looked down upon. The votaries of classical training were able to say that the great men of history had been men of classical training. They could support their assertion with the figures. They could say that of the men who had risen to prominence in whatever line they chose to select, the great majority were men of classical training. But they overlooked the fact that a man in those days who had any training at all had to have a classical training; that if he had the advantage of any education, it was a classical one.

The past fifty years, largely as the result of engineering, have developed a new kind of education in which the classics have been left out, and we are to consider whether on the whole that is best. First it was argued that the practical side had no place in university training; then, that the cultural side could be properly omitted, and the demand was for the practical; but one might as well say that, as glass is good for windows, he will build his house's walls of glass, or, because wood is good for the panels of a door, that he will make the window panes of wood. The sensible position is an intermediate one. The two things must come together, each in its proper place. But, unfortunately, with the antagonism of classics toward engineering, or more properly toward the engineer, as he rose in the world he had ground into him a reflex antagonism toward the classics which he looked upon as his chief enemy.

As time has gone on, engineering has advanced both in influence and in learning. I venture to say that ten years ago an engineer would hardly have been invited to speak upon this subject before such a gathering as this; and even though he had been, he hardly would have said the things I am prepared to say.

When the institution of Civil Engineers of Great Britain was formed, it adopted in its constitution Thomas Tredgold's famous definition: "Civil engineering is the *art* of directing the great sources of power in nature to the use and convenience of man;" but at the present time I contend that Thomas Tredgold's definition is insufficient. If it were sufficient, it would not seem to be necessary to appear here as an advocate of classical training for engineers. I maintain that engineering ceased a considerable time ago to be an art; and I would say: "Engineering is the art and *science* of directing the great sources of power in nature to the use and convenience of man;" and I would distinguish between an art and a science, in that science is classified knowledge, while an art is merely

based on information; the scientist knows *why*, the artist knows only *how*. The engineer must know both. He must not only know the rule, but the reason for the rule, the underlying conditions which have produced that rule. So the engineer of today is reaching back to those days when devotees of natural science were not looked upon as mere practical men; when they were received and courted by the most cultured; and when the literature of the time, the most popular literature, was made up of their work. We are going back to look at the productions of Descartes, Newton, Bernoulli, D'Alembert, Prony, and Bacon, and of many others whose names are famous on the pages of history, and whom one does not ordinarily think of as belonging to the engineers in any way.

When the engineer goes beyond the merely practical results, to the arrangement of those practical results with a view to discovering within them the law according to which their causes operated, something more is required than the mere observation of everyday occurrences that one is taught in the course of a practical training. It requires an attention to detail and an inquisitiveness that is seldom observed in one who has come up simply as an apprentice. The development of the reasoning faculty is not to be found in the solely practical. The devotion to detail is the thing that must be looked to, to the fine differences and the fine distinctions, whether they be in the construction of a sentence, in the establishment of a theory, or in the mending of a road.

The engineer is now called upon to describe his work, to lay down rules for its furtherance, and when he lays down his propositions they must be so laid down as not to be misunderstood. In other words, the engineer must be a master of his language. How can he become so? He must acquire a large vocabulary. And how can this best be done?

There are those who urge that for the engineer the sciences offer all that is necessary, and that the time spent upon any language at all is wasted. The next step after asserting that the sciences offer all that is needed, when that is shown to be untenable, is to assert that modern languages supply the deficiency, and we have the error of that idea before us in many of our present students. Anyone who has studied the ancient languages feels that there is something very materially lacking in the groundwork of the modern languages. German and French seem like a child's production as compared with the structure of Latin. Nor can one properly understand English without an understanding of the Latin grammar, I believe, though he should study it until he were gray. There are features of language which the study of English in itself does not bring out, and which cannot be brought out until one goes back to its parent tongue; and it is in these distinctions of meaning that the engineer must ultimately become versed. Oftentimes we look upon the study of language, and the student particularly looks upon it, with a view to its practical use. He says: "I can study German, and it will be of some use to me; I can study Latin, but what good is that to me? Nobody speaks Latin." That is the very fortunate thing about it! Nobody does speak it. If you study Latin, you do not study it to speak it. If you wish to learn to speak German, go and live with a German family; do not waste your

time in a classroom. It is not the purpose of the study to learn how to speak the language; the purpose is to understand its structure, and thereby understand the structure of our own language, and incidentally to acquire facility of expression.

There is nothing in which engineers today are so lacking as in the ability to express their thoughts; and there is nothing that will so surely give one such an ability as the translation from a foreign tongue; and the more delicate is the distinction of meaning in different foreign constructions, the better it is for the student.

There is one more point bearing on the question as to whether the training in the high school shall be in Latin or in a modern language. Latin, if it is taught at all, is taught well; and I may say that it is very rarely that the modern languages are. A thing well done, one thing well done, is worth any number superficially done.

We find today that the students who are entering college do not seem to be capable, on the average, of such a high grade of work as those who entered a few years ago. There seems to be a deterioration of the quality of mind, in its adaptability or its training. It has been said that the students who enter college today expect knowledge to be pumped into them or fed to them with a spoon. They look upon college as a kindergarten where they are to take their ease, and have information administered in sugar-coated preparations. They think that they can understand a thing when it is demonstrated before them, and they think that they have acquired it when they merely see it, though they could not reproduce it to save their souls. The result would be the same in translating, if one should read through a book catching here and there a word that he knew, and passing the others by. He would not get far in an understanding of his translation. The student must cover his whole subject; he must see what every word means; he must know the nice distinctions; and by the time he has accomplished that he has absorbed his subject, and when he has had four years of this training in language, he will be able to treat his mathematics in the same spirit.

Coming to the use of ancient languages in the understanding of words, it is not necessary to go so far as terms like "pseudomorph" or "toxicogenic," and those which are made up of two or three ancient roots. Take such simple words as "affect" and "effect." I venture to say that 95 per cent. of the students of the senior class of this university who have not had a classical training will fail to distinguish the difference between those two verbs; and yet the difference is quite essential and it is especially essential to the engineer.

The information that a student absorbs during the early days of his life, after all is said and done, is not such a very important thing. A great deal of it will very likely cease to be accepted as correct information before he has gotten through college, particularly if it is along many of the scientific lines. We should, therefore, even in the high school, look more to developing and directing the student's mind, than to filling it with miscellaneous bits of information here and there.

If I were to say what would best comprise the preparation of the student for the engineering course, at this time; if I were to lay out four years' work, it would be something along this line, assuming that the student carries four major subjects each year.

I should put first for the first year: English grammar, composition, and spelling—do not forget the spelling. I think I would put next arithmetic, because the student should get through arithmetic in the earlier part of his course. He should be thoroughly trained in it in the grammar school, because, although arithmetic is a true science, a great many things in it must be actually learned, must be impressed upon the student's memory. He will not have time in after-life for counting up to discover that two and two make four, or figuring out the multiplication tables. He must know them. I would put next in the first year Latin, and then I would put history.

Going to the second year, I would put Latin first, I would put algebra second and I think I would introduce physics, elementary physics, because then it is time that the pupil should begin to appreciate some of the laws of nature. I should prefer history to make up the last study, but out of deference to some of my scientific friends I would submit to biology.

Third year: Latin first, algebra second, English composition and rhetoric third; then another language, either German or Greek—it would not be French. Not that I have anything against French, but if one has a thorough foundation in Latin, French comes too easily to warrant any time in its acquisition in the high school.

For the fourth year I would put Latin first, geometry second; then I would put English literature, the reading and the speaking of the masters of English—and I consider this a very important one of the branches: the understanding of a great language, the formation of an accurate vocabulary, the development of a taste for something besides the vernacular. What we need today is less of the dialect and more of the pure English. It would be better for our language, if those who are seeking to perpetuate the dialect of the plains and of the "poor white trash" of the South would cease their efforts, and let us get back to the language of Thackeray and Scott. Then as a fourth branch I would put in either German or Greek.

In closing, it may be well to state what inclines me so strongly to Latin. My father did not have an opportunity to study it, but he thought that it was wise that his son should, and a portion of my time in the high school was devoted to that subject. With a retrospect of twenty years, it seems to me I am warranted in saying that I could have better spared any other course that I took in high school than the Latin. If something must have gone, if I could have taken but three-fourths of the subjects that I took, the Latin would be be first and foremost, the one thing that would not have been left out.

VI. DISCUSSION OF PROFESSOR SADLER'S PAPER

GEORGE W. PATTERSON
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In discussing my colleague's paper on "The Value of Humanistic Studies as a Preparation for the Study of Engineering," I wish to raise my voice in favor of things whose bread-and butter-value is not evident.

Herbert Spencer,[1] in his essays on *Education*, writes at length on "what education is most worth." He says:

> If we inquire what is the real motive for giving boys a classical education, we find it to be simply conformity to public opinion. Men dress their children's minds as they do their bodies, in the prevailing fashion. As the Orinoco Indian puts on his paint before leaving his hut, not with any view to any direct benefit, but because he would be ashamed to be seen without it; so a boy's drilling in Latin and Greek is insisted on, not because of their intrinsic value, but that he may not be disgraced by being found ignorant of them—that he may have "the education of a gentleman"—the badge marking a certain social position, and bringing a consequent respect.

While in general men of science will agree with Spencer in looking upon an education limited to so-called humanistic studies (meaning thereby polite literature, grammar, rhetoric, and poetry, including the study of the ancient classics) as a very narrow and bigoted kind of education, yet I am not willing to stand on his side and say that science is the exclusive education of most worth. His wholesale belittling of the classics makes me class him also among the bigots. Is not a position intermediate between the extremes, the sensible place for parents and teachers to stand?

For the sake of definiteness I shall consider whether or not the engineer is better fitted for his life-work if he has had a full high-school course in Latin preparatory to entering the study of engineering. I wish my sons to study Greek too, but I shall base my thesis on the study of Latin.

For the engineer, then, what knowledge is of most worth? And does it include Latin? Knowledge is classified by the thinking man into, (*a*) value for itself alone, (*b*) value for foundation for other knowledge, (*c*) value for training solely.

Let us consider Latin under these three heads, taking them in their inverse order. The boy, or the girl, needs foundation on which to build his education, just as surely as any other builder needs a secure foundation; and, in my opinion, the value of a subject for the foundation training of a boy's mind is of great importance. Now Latin, with its structure obeying fairly consistent rules, is able to furnish the mind with exercise of practical value comparable with the value of exercises to the musician. The study of Latin grammar gives good oppor-

[1] Herbert Spencer, *Education*, p. 7.

tunity of holding the pupil to good consistent work, and leaves little room for vagueness.

But the value of Latin for training solely would not be a sufficient excuse for its use in the education of the child; for the same argument might be made with reference to Sanskrit or Arabic. So let us turn to the consideration of Latin under the second heading—value for foundation for other knowledge. Language study, even if without value in itself, or as training for the mind, is yet necessary for the well-informed engineer; for he should be able to keep abreast of the progress of his profession in other lands, and a reasonable knowledge of French, German, and perhaps Italian may be looked upon as necessary tools of his trade. In my opinion, these modern languages will be better acquired by an engineering student who has had a good Latin training.

We have already established the right of Latin to be included in the curriculum. We shall, however, not rest with a simple right to be included—we shall go on and say that it is unwise to leave the student any option in the matter; and the justification for this stand is that Latin is not only of value for training and for foundation for other knowledge, but it is also knowledge of value for itself alone; in other words, it is a part of "knowledge of most worth." This will be seen when we consider that the Latin language is the most extensive source for the words of our own language, and that no one can really know English, French, or Italian who is a stranger to Latin. The engineer is not a man apart from the rest of mankind. To be a success as an engineer, he must be a man among men who are largely in other walks of life. He must be able to write clear, concise, accurate reports to his clients or employees; and a thorough mastery of English is a tool without which the owner cannot afford to be. Let our engineer, then, be a man of all-around culture, who, though a modern man of science, does not fail to appreciate the good things of yesterday, today, and I believe tomorrow.

But many say that there is not time for four years of Latin in the training of the engineer. I believe that there is not only room for four years, but even room for six years. Why do we tolerate useless studies? Why do we compel our children to learn obsolescent tables of weights and measures, to be forgotten tomorrow? Why do we have courses in physiology whose object is to give children perverted notions of a grand science? Why do we have courses in patriotism—a thing which every boy should learn at home? Why do we waste precious time in mastering absurd spelling? Answer these questions by saying that we will reform our ways, and then the engineering student will find plenty of time for four, or better six, years of Latin, and even some Greek too, and thus not neglect a part of knowledge of most worth.

VII. A CURRENT VIEW OF COLLEGIATE EDUCATION FORMULATED IN PROPOSITIONS

JOSEPH B. DAVIS
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1. Languages are not "practical."

2. A college education has no especial significance. It is a fashion to go to college, so children are sent.

3. College should prepare people for obtaining money.

4. There must be a shorter way of getting into college than through the preparatory schools.

5. Enrolment in a college adds an indefinable, but vast, accretion to one's learning and wisdom.

6. Preferences not justly earned, are expected—"graft."

7. High-school graduates are prepared to begin the study of a profession.

8. Anyone can plan a college course, a course that will be ever so much better and more "practical" than the one planned by those who have spent their lives at such work. Children are especially sure they can do this, and are not only permitted, but encouraged, to do it.

THE SOCIAL SIGNIFICANCE OF THE JUVENILE COURT

HENRY W. THURSTON
Probation Officer, Juvenile Court, Chicago

On July 1, 1899, there went into effect in Illinois a so-called "Juvenile-court law." This law marks a new epoch in the care of children in the United States. Previous to this some of the features of this law were in operation. For example, since the early seventies some forms of a probation system have been in operation in Massachusetts. In New York and Colorado children's cases were heard apart from the cases of adults. For centuries also, in Anglo-Saxon countries, dependent children had been dealt with by the state in the parental spirit. But never before had there been so complete a recognition of the fact that a delinquent as well as a dependent child should be treated, not as an adult, but as a child. Previous to this time children up to a certain age, say seven years, who committed an offense against society were not recognized by the law, while all children above this age were looked upon by the law as criminals, fully responsible for their own actions, to be dealt with by the same forms of law as all other criminals. In contrast, the spirit of all juvenile-court laws is shown by this statement from the Illinois law.

> This act shall be liberally construed to the end that its purpose may be carried out, to wit, that the care, custody, and discipline of a child shall approximate as nearly as may be that which should be given by its parents, and in all cases where it can properly be done, the child to be placed in an approved family home and become a member of the family by legal adoption or otherwise.

The age during which this parental care was to be exercised by the state was fixed at sixteen years for boys and seventeen for girls.

Since this first juvenile-court law was passed, Colorado has very much improved upon it, first by making the definition of delinquency more inclusive, and by making adults who contribute to the dependency or delinquency of a child responsible before the law. This provision was incorporated in the Illinois law of 1905, and the age limit was raised to seventeen years for boys and to eighteen for girls. Other states,

to the total number of twenty-two, have also adopted in some form a juvenile-court law. In England, Italy, Australia, Sweden, and other foreign countries the movement has likewise taken root. Recently Sweden has sent a national representative, who is now in the United States to study juvenile-court laws and procedure in all of our most progressive states. A similar study was made by an agent of the Central Howard Association in Rome, which report was read in 1905 at the International Prison Conference at Budapest, Hungary.

In 1905 the state of New York, by an act of the legislature, appointed a Probation Commission of the highest quality headed by Homer Folks, "to make careful inquiry into the operation of the probation system in the state of New York." This commission studied the probation system, not only in all of the principal towns and cities of New York, but also in the cities of several other states, including Illinois, Colorado, and New Jersey. The findings of the Commission have been reported in an exhaustive pamphlet of ninety pages and a supplementary act of twenty-two pages, which they ask the people of the state of New York to enact into a law, the purpose of this law being to systematize and make effective the probation system of the juvenile court of the state of New York. Whether or not this act now becomes a law in the state of New York is not so important as the certainty that the report has set an authoritative standard by which to judge juvenile-court work, not only in New York, but in the whole country.

This brief reference to the history of the movement suggests something of the practical importance of the juvenile-court method of treatment of children, shown by the attention, legislative or otherwise, that is being given to it.

From the social point of view it may likewise be said that this great movement is profoundly significant, because it is the most effective expression of the twentieth-century opinion that *all children are entitled to childhood.*

The people of the United States have long prided themselves upon their ability to discover and to develop their natural resources of every kind. Every element of soil, forest, mine, stream, and climate that can by any possibility contribute to the wealth and welfare of America has eagerly been sought out and exploited. Even the so-called by-products in extractive and manufacturing industries are being very

carefully re-examined in the light of the most modern scientific information. In many cases these by-products are being made to contribute more largely to the wealth of society than the original product with which they were connected.

In a similar way the people of the United States have long prided themselves upon their public-school system, and their free religious, political, and social institutions; and we have supposed that the natural resources of our children were by these means being fully discovered and developed toward full-rounded manhood and womanhood for every child.

At last, however, we are coming to see that too often the institutions such as the home, school, church, and municipality, either are failing to do their particular parts toward developing the sacred resources of childhood committed to their care, or are so failing to co-operate with each other in the care of thousands of particular children that these unfortunates fall between their separate jurisdictions, and thus lose those opportunities of development that belong to childhood. In short, it is day by day becoming clearer to all who are endowed with clear social vision that, somehow or other, as a by-product of our civilization children are in an appalling number of cases in danger of being thrown upon the scrap-heap and among the waste products of our daily life. For example, in the city of Chicago alone, in the year 1905, 4,088 of such a class were brought, for the first time, before the judge of the juvenile court. We are all familiar with the public-school building in which there may be twenty teachers and fifty children to a teacher. Such a school building contains one thousand children; and who of us has not seen, at the close of a school session, this army of youngsters pour out of every door, sometimes windows, of the public-school building? Multiply this little army by four, and you get some faint conception of the number of children who, with their fathers and mothers and friends and probation officers have filed in mournful and ceaseless procession before the judge of the juvenile court of Chicago during the one year, 1905. And this sort of thing is not peculiar to Chicago. In every town and city, where the juvenile-court machinery is set up and an effort toward saving all children has been made in earnest, whether the city be as large as Chicago or New York or only a town of from five to ten and twenty-five thousand people, the magnitude of the task

undertaken, both as to the number of the children and the variety and quality of their distress, is a revelation to those connected with the juvenile court.

In view of this wholesale attempt to deal with all neglected and delinquent children in the proper parental spirit, it may be asked: On what does the juvenile-court work depend for success? The judge of the juvenile court has only one question to ask: "What, in view of all the circumstances, is best for this child?" When this question is asked, as it is being asked in all the juvenile courts of the country, there are three principal answers:

I. The child may be put under institutional care.

II. He may be put under probation.

III. Work of a preventive sort can be done upon the environment of the child.

A brief discussion of each of these forms of effort follows:

I. INSTITUTIONAL CARE

To one who sees only dependent and delinquent children, unworthy parents, and the pathos of family separation, a session of the juvenile court seems a continual tragedy But to him who likewise sees the institutions and agencies through which the parental love of society stretches out the helping hand to every kind of juvenile misfortune and mistake, the juvenile court seems to be in a truer sense an open door of hope.

Only those children are sent to institutions who, in the opinion of the judge, are so neglected in their homes, or so wayward in their own tendencies, that their welfare demands that they be taken out of their evil surroundings. But the same spirit that is back of the juvenile-court movement itself is likewise leading those in charge of the juvenile institutions to see more and more clearly that this cannot be a permanent arrangement for the dependent or delinquent child. Varied and humane as our institutions for children may become, the institution must be looked upon as only a temporary home for most children. The aim must ever be to use the institution as a temporary abiding-place and place of training for a child, until he can be removed to his own home, or until he can be passed on through the institution into a foster-home. We shall never be able to get on without institutions for

the care of children, but the parental spirit that animated the juvenile-court movement will, on the other hand, never permit society to rest content while dependent or delinquent children are, as a rule, cared for only in institutions. Furthermore, our institutions themselves must increase in variety and individual adaptation to the educational needs of all kinds of children, in order that, while under institutional care, children may not be treated *en masse*, but as individuals. Our institutions must provide for every kind of childhood need, instead of doing as many of our institutions for delinquent boys and girls are now doing —herding together in one great building children of ages varying from eight to seventeen and eighteen, and varying in forms of delinquency from mere mischief to the worst forms of immorality and social crime. "The social significance of the juvenile court" demands some such changes as have been indicated in the institutions to which the judge of the juvenile court commits children.

II. PROBATION SYSTEM

The child who is not sent to any institution may be sent back to his home, or to the home of some relative or friend, and put "under probation" to a probation officer. Each of these children needs some human influence that never before came into his life, if he or she is to grow into a good citizen instead of a bad one. The life of each such child is in some sort of a tangle. It is the delicate task of the probation officer to become such a friend of the child that he is able to see the causes of the tangle. Then the probation officer must, in person or with the aid of others, strive to remove these causes of evil and misfortune, and surround him with helpful people and uplifting conditions. In some cases, if the child is to be saved to his better self, this watchful care must be kept up for years.

A second kind of work, no less delicate, is expected of the probation officer. In a large percentage of cases of children taken from parents and guardians, application is later made to the court to restore the children to their homes. If parents have been drunken, or in such poverty or vice that the children have been taken away, the probation officer must now report to the court if the conditions are so much better that the child can have a fair chance for a healthy and right life in the home again. In this way, for the sake of the children, many men and

women of doubtful lives are practically in the care of probation officers. Hundreds of cases of complaint about delinquent or dependent children come into the office of the chief probation officer every year. Each is referred to the officer in the district for investigation and report. Many more such cases come directly to the attention of the officers in their own districts. The more efficient the officer, the greater the percentage of such cases, which are settled in the best interests of the child, without bringing them into the juvenile court.

From this brief statement of the work of a probation officer it may be inferred that only the highest type of man and woman can make an ideal officer. Among other characteristics that should be thought of as essential in such officers are: good health; sound common-sense; love for children; sufficient education for accuracy and rapidity in making out papers and reports; such an ideal of the importance of the work that conscience will not permit him to neglect anything within his power for the good of the child; and such a broad-gauge view of social classes, nationalities, politics, religion, etc., that he can get into sympathy and harmonious working relations with every person and institution in his district that can possibly be of service in upbuilding the life of any child.

The number of probationary cases that a probation officer can properly attend to is, in my judgment, not over seventy-five. The actual number is often twice seventy-five. In harmony with the parents, the school, and the rabbi, minister, or priest of the special parish in which each child belongs, there should therefore be a group of the best men and women upon whom the probation officer could call for special help in the form of employment, material aid, or personal friendship for the children under probation. These volunteer helpers should at all times work under the legal probation officer and in no case enter a family as a dictator, a meddler, or for curiosity. Unless they can bring some new help into the life of a child, with such delicate tact that he and his guardian do not resent it, they will not succeed.

In Indianapolis, Ind., the probation work of the juvenile court is carried on more largely by the leading men and women of the city, under the direction of the chief probation officer, than in any other city in the United States. In Chicago a similar movement is on foot, but in this latter city the volunteer workers are being gathered around the paid

district officers. In one of these districts there are one hundred such volunteer workers, fairly well organized, and doing persistent and effective work. In other districts the number of these workers varies from none to about twenty-five. It is not believed, however, that this movement will supplant the work of the regular paid officer, but rather supplement it.

From the point of view of the paid probation officer, this volunteer movement is not unlike the problem of the mother with several growing daughters, who finds that to teach her daughters to bake, make garments, and keep house is for the time more of a task than to do these things herself. The educational effect upon the daughters and upon the volunteer worker, however, should ultimately result in relieving the mother and the paid probation officer. It is probable that the direct educational effect upon society of the volunteer movement will be more valuable to the juvenile court than the immediate helpfulness in caring for the wards of the court. Children can be helped only by helpful people; and the more helpful people that can be wisely enlisted in the care of needy children, the better.

III. SUPPLEMENTARY AND PREVENTIVE WORK

Closely associated with the work of the probation officers of the juvenile court are many other agencies with which the court is closely related. For example, truancy, dependency, and delinquency of children are closely related. The compulsory department of the board of education looks after truancy, and the probation officers have jurisdiction over dependents and delinquents. Sometimes a child may be a truant, dependent, and delinquent at the same time. For the sake of the child, the closest co-operation is necessary. Often the teacher is the strongest ally of the probation officer. Unless each can work in such a way as to strengthen the influence of the other, the child suffers.

The factory inspectors also run across many cases of dependent and delinquent children, which they report to the juvenile court. Probation officers likewise find many conditions for which they invoke the aid of the factory inspector.

In a similar way there should be close co-operation between the various charitable organizations, both public and private, and the probation officers of the juvenile court. A family is often brought into

a juvenile court where one or both parents will not care for the children. In such a case the promise of the judge of the juvenile court to take their children away unless they do better, and an order putting the children under the care of a probation officer, frequently prove efficacious. The danger is that the probation officer will become so overloaded with dependent cases that he cannot properly look after delinquent children. There is, therefore, the greatest need of such co-operation between the juvenile-court work and charity work as shall strengthen both.

All these forms of social service are needed to supplement the probation work of the juvenile court. One who has worked for even a little time in the juvenile court becomes more and more strengthened in the opinion that, while institutional care of children must always be kept up, and while the probationary care of children with all the supplementary forms of service must be developed to the highest degree of efficiency, after all, both forms of care of children are to a very great degree only palliative and unsatisfactory. Such a worker feels more and more keenly the force of the biblical injunction, "These things ought ye to have done, and not to leave the others undone." In short *the juvenile court is a challenge to existing institutions.*

Inquiry must ever be directed toward all forms of preventive and constructive work in behalf of the child, to the end that a smaller and smaller percentage of children shall become dependent and delinquent. During every court day the failure of every institution of society with reference to some particular child is revealed to the judge and probation officers of the juvenile court. It is, therefore, inevitable that the same social spirit which created the juvenile-court law and the probation system will not be satisfied with merely palliative measures. The mere act of massing juvenile misfortune and delinquency of a great city or town in one room is a great social object-lesson, and will of itself lead to the inquiry: "How can this be stopped?"

The phenomena of child misfortune are for the first time being brought, by the machinery of the juvenile court, forcibly to the attention of all intelligent and philanthropic members of society. The next steps in the juvenile-court movement may, therefore, confidently be expected in the direction, not only of perfecting the institutional and probationary care of children, but in preventive measures. Illustra-

tions of this are being manifested in several directions. For the last two or three years Judge Lindsey, of Denver, the high-priest of the juvenile-court movement, has been developing the "Juvenile Improvement Association," which is devoted to the protection of the children of Denver against every destructive tendency, and toward furnishing to them the best possible positive means of development.

During the month of April, 1906, there has also been organized in the city of Chicago a similar incorporated organization, known as the "Juvenile Protective League." Three of the objects of this league, as stated in its by-laws, are as follows:

1.) To suppress and prevent conditions, and to prosecute persons, contributing to the dependency and delinquency of children.

2.) To co-operate with the juvenile court, compulsory education department, state factory inspector, and all other child-helping agencies.

3.) To promote the study of child-problems, and by systematic agitation, through the press and otherwise, to create a permanent public sentiment for the establishment of wholesome, uplifting agencies, such as parks, playgrounds, gymnasiums, free baths, vacation schools, communal social centers, and the like.

The directors of this league have been chosen from the strongest and most efficient workers in behalf of childhood in the city of Chicago. Some of the concrete ways in which such movements will doubtless find expression are as follows:

a) The concentration of the attention of all classes of social workers upon the improvement of the home in all possible ways. A fit home for every child is a social necessity.

b) A re-examination of the function of the school, to the end that a smaller and smaller percentage of the children shall become truant and delinquent. Society cannot long tolerate the suspension of troublesome children from the public schools.

c) A more careful study of the relation of the church to the problems of childhood, especially as related to the Sunday school and other religious exercises of the church.

d) A stimulation of the movement for an adequate play opportunity for every child.

e) A similar stimulus toward such municipal sanitation, inspec-

tion of food-supply, and control of diseases as will permit a normal percentage of children to survive.

f) A more efficient charitable organization, especially in relation to the responsibility of adults for the dependency of children.

g) Criticism and control of the industrial order, so far as it tends to destroy children.

h) A frank and full discussion of the sex question as related to birth and education of children.

In short, the chief social significance of the juvenile-court movement in connection with the child-labor movement and the compulsory-education movement, is to be found in the inevitable educational effect upon the intelligence and conscience of society. Because of the juvenile court we shall the sooner become convinced that the proper genesis and education of children is the *biggest job ahead.*

HOW MAY MANUAL TRAINING BE MADE EDUCATIVE?

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Some years ago (not so long as many think) there arose a cry against the public-school course of study in this country, on the ground that it was too theoretical. By this was possibly meant that too much time was given to the theory as to how things were to be done, and too little time to really doing them. In a confused sort of way, also, it was felt that neither the subjects nor the teaching fitted into life, and that the pupil knew about as little about real life, and how to live, after as before attending school. These charges were just and true. In response to this outcry, manual training was introduced to bring us the practical side of the curriculum. It gave its attention, for this reason, to the practical side to the exclusion of the theoretical. "Learn to do by doing," was its war-cry. But its advocates did not see that we must have something in mind to do before we begin the doing. So bent were they upon doing that they seemed to think it necessary to discard all theory, simply because it belonged to the other side in the conflict which they were called to oppose. Their opponents, however, made quite as serious a mistake in supposing that pure theory is worth teaching within itself. A theory is good only because it will work, and the only earthly use for it is that it may show blind mortals how to do things. The manual-trainingist went just as far in the opposite direction, and forgot that we cannot really learn to do by mere doing, any more that we can learn to think by mere thinking. Kant taught the world long ago that, although our knowledge begins with experience, it does not follow that it all comes from experience. It could not but logically follow from this extreme view of practical teaching that handwork should become mere industrial training, aiming at the finished product and the dextrous mechanic. This trade notion we have discussed in the paper preceding this one. What we are concerned with here is the great chasm which this conflict created between theory and practice. So far has it grown that the school-teacher feels

them to be two distinct methods of teaching, and that it is a crime to hold to one and tolerate the other. Above all things that the American teacher needs to learn today is that theory and practice must be brought together in every recitation. Our ideas are entirely too vague on this subject.

The first question to settle, then, is: "When is hand-work truly practical?" Certainly not when there is no thought in it. Constructing products at random, with no purpose or theory, is above all things highly impractical. To keep a child doing something just because we believe in doing is senseless. Hand-work is practical when the teacher and the pupil are fully in possession of a clearly conceived theory which they are endeavoring to apply in the hand-work, and it is not practical otherwise. This is true in other studies as well as in hand-work. No teacher in mathematics would allow his pupil to continue work at the blackboard, if he should discover that there is no definite theory clearly outlined in his mind which he is attempting to apply. The chemist in the laboratory would not think of allowing the student to continue indefinite experimenting, unless he knew that he was the master of the thought-processes involved, and was keenly conscious of them at the time of the experiment. If it is true in other studies, it ought to be true in manual training also. We have just made a plea for the union of theory and practice in *all* studies; hand-work is the best example of those studies which are highly capable of this union. There is perhaps no study so adapted, which lends itself so rapidly to this idea, as hand-work. It ought to do a revolutionizing work for other studies in showing how successfully theory and practice can be combined. We must not allow this divorce to continue, and it certainly seems to be the mission of manual training to lead the way in teaching the facility of a complete interworking of good theory and good practice as closely together as possible. So, in making the plea that manual training realize this union as it has not done, I am pleading for all subjects in the curriculum and not for manual training alone.

The theories or thoughts about any kind of hand-work are of two classes of facts: first, the technical facts, which we have so far discussed; second, the social facts. The technical facts have not been wholly neglected, but have never been the prominent and conscious elements

which they must be in the future, to make hand-work truly educative. The social aspect has been almost wholly neglected.

I can only intimate in the briefest way what is meant by socializing hand-work. There are immense fields of thought back of even the materials used in hand-work. Vast industries and millions of men are at work producing them. Even the finished product, if it is worthy of teaching, engages thousands of persons in the world. Shall we pass over all this as worthless? Shall we subordinate it to a mere tool? Is it relatively of such minor importance that the child should learn to sympathize with the great industries and classes of people engaged in the world's work? We think not. We believe that the child should as much know society as he should know how to make some things which society needs. The informing of his intellect, as well as the demand that he sympathize with and understand the world in which he must live, demands this. All subjects taught must lead the child into life, must show him something of the composition of the world in which he is to live, something of its demands upon him, in order that he may find his place in the world. Herein is the vast difference between industrial training and educative hand-work. As we have said, the chief idea in the former is the finished product; the chief idea in the latter is the growth of the learner. Our plea is that this latter purpose dominate the mind of the teacher. We are not wishing the other neglected, but manual-trainingists have almost forgotten that they are teaching children and not subjects.

The development of the powers of the child must not be sacrificed to the development of a finished product. The public will sooner or later banish any study from the curriculum of the elementary grades which does this. Manual training is too vital to education to allow it to be murdered by its own friends. No educator can impartially study the situation and admit that we can spare it from the course of study. But we shall be forced to spare it, if we do not place it upon an educative basis, if we do not develop the child's reason and sympathy by it, rather than neglect the child for one weaker phase of it. For it certainly *is* the weaker element in hand-work that we are now getting. The dogmatism and lack of reason referred to in the trade-school notion of the subject, which has dominated the teaching of it, is not so valu-

able as the teaching of its facts by a development of reason in the subject. The negress who learned to cook by slavishly following the instruction of the mistress, if taken out of the kitchen for a few years, almost entirely forgot the art. The pupil taught without being led to reason out the detailed steps one by one likewise loses the entire subject. This developing of reason is again one of the answers to our question: "How is manual training to be made educative?" To do this, large principles must be taken, under which to subsume numerous facts, which have been formerly left as a group of unrelated data. If one large principle is carefully worked out by the teacher, and kept clearly before the minds of the students, then the causal relation of the different steps will easily and logically follow.

We have thus tried to show that hand-work may be differentiated from trade-work and become properly educative, by (1) stressing the combination of theory and practice more; (2) by such teaching as will prove to the pupils' minds that the work is not mere doing, but that it is the application of thought, that thought is its predominant feature; (3) by showing its immense importance as relating to the life of the world; (4) by settling upon large principles instead of disconnected facts; and (5) by developing the causal relations, and thus training the judgment and reasoning faculty of the child; in a word, by changing our present point of view from the product to the child.

A NEW MOVEMENT AMONG PHYSICS TEACHERS

CIRCULAR II

The answers to the circular sent out about two months ago by the committee of the Central Association of Science and Mathematics Teachers have revealed the fact that there is a widespread interest throughout the country in the problem of more efficient instruction in elementary physics. The circular was printed in the March numbers of *School Science and Mathematics* and of the *School Review*, and in addition 1,600 copies were mailed to individual physics teachers. Altogether 275 answers have been received. These came from 80 colleges, 30 normal schools, and 165 high schools. The geographical distribution of those who answered is as follows:

Canada, 2; California, 11; Colorado, 6; Connecticut, 4; District of Columbia, 4; Georgia, 2; Illinois, 38; Indiana, 7; Iowa, 11; Kansas, 7; Kentucky, 1; Louisiana, 1; Maine, 5; Maryland, 2; Massachusetts, 24; Michigan, 19; Minnesota, 8; Mississippi, 1; Missouri, 7; Nebraska, 4; New Mexico, 1; New Hampshire, 1; New Jersey, 5; New York, 33; North and South Carolina, 3; North and South Dakota, 5; Ohio, 26; Oregon, 1; Pennsylvania, 18; Rhode Island, 1; Tennessee, 2; Utah, 1; Vermont, 2; Virginia, 4; Washington, 3; Wisconsin, 5.

The tabulated summary of the answers received is as follows:

Question 1. In counting the vote on the list of experiments, the college, the normal-school, and the high-school returns have been kept separate. Every experiment that received a total majority (138) vote appears in the list. Those marked with an * received a total two-thirds vote (184). The numbers in the last column under "success" are the returns from question 3; they tell how many votes each experiment received as being one of the most successful ones in the list.

Question 2. Numerous additional experiments have been suggested. For lack of space we present only those that were suggested by three or more teachers. The numbers indicate the vote. If you wish to have any of these added to the list, please vote on them as before.

College	Normal	High	Total	Success		
80	30	165	275	128		TOTAL VOTE
*59	23	138	220	52	1.	Weight of unit volume
*50	19	130	199	67	2.	Lifting effect of water
*71	25	158	254	91	3.	Sp. g. body denser than water
*51	19	128	198	52	4.	Sp. g. of wood with sinker
41	22	109	172	45	5.	Weight of water displaced
*68	23	143	234	73	7.	Sp. g. of a liquid
*60	23	127	210	64	8.	Lever of the first class
45	11	97	153	26	9.	Center of gravity of lever
43	18	102	163	36	10.	Levers of 2d and 3d classes
*61	21	134	216	45	13.	Three forces in a plane
*50	21	131	202	29	14.	Inclined plane
49	18	105	172	35	17.	Pulleys
*74	24	149	247	65	26.	Pendulum
*76	23	145	244	60	28.	Boyle's law
*62	19	111	192	32	30.	Barometer
*66	17	159	242	49	36.	Testing a thermometer
*71	21	124	216	53	37.	Linear expansion
*69	24	141	234	57	41.	Specific heat
*67	22	143	232	50	42.	Heat of fusion of ice
*52	19	119	190	31	43.	Heat of vaporization
36	18	96	150	20	45.	Relative humidity. dew-point
56	23	94	173	29	51.	Boiling-point and pressure
*62	22	118	202	46	57.	Wave-length by resonance
51	19	87	157	24	58.	Number of vibrations of fork
56	19	82	157	38	61.	Phenomena of electrostatics
*61	22	120	203	62	62.	Phenomena of magnetism
*65	26	150	241	77	63.	Magnetic field with filings
*56	23	139	218	55	66.	Single-fluid cell
38	13	108	159	36	67.	Two-fluid cell
*53	22	114	189	29	68.	Battery grouping
51	15	77	143	25	69.	D'Arsonval galvanometer
*57	19	111	187	35	70.	Induced currents
53	21	108	182	29	71.	Resistance by substitution
*61	22	115	198	53	72.	Wheatstone bridge
52	22	100	174	33	76.	Electromagnet
36	20	106	162	46	77.	Electric bell
41	16	113	170	34	78.	Telegraph instruments
*46	20	119	185	29	79.	Electric motor
46	20	104	170	22	80.	Dynamo
*65	28	152	245	66	85.	Plane mirror
43	17	96	156	29	86.	Spherical mirrors
*61	23	124	208	56	88.	Index of glass
*65	22	136	223	57	91.	Focus of converging lens
57	20	104	181	43	92.	Conjugate focal lengths
*54	20	117	191	31	93.	Relative sizes of object and image
44	18	82	144	12	94.	Virtual image
*55	24	129	208	44	100.	Photometer

Vernier and micrometer, 25; comparison of units of length, 16; use of chemical balance, 9; value of π, 4; uniformly accelerated motion, 4; center of gravity, 22; falling bodies (Whiting's method), 5; wheel and axle, 7; acceleration on inclined plane, 6; principle of moments, 5; inertia balance, 3; determination of g,

10; develop $f=ma$, 4; law of centrifugal force, 6; fluid pressure, 10; hydraulic press, 3; pumps, 6; siphon, 5; hydrometer, 4; rate of exhaustion in air-pump, 3; heat conductivity in liquids, 4; convection currents, 4; cubical expansion of mercury, 3; laws of vibrating strings, 22; Kundt's tube, 9; fall of potential on a wire, 5; wireless telegraph, 3; telephone, 6; specific resistance, 4; Ohm's law, 5.

Question 3. The vote on the most successful experiments is given in the fifth column of numbers in question 1.

Question 4. The following experiments are not satisfactory to three or more of those who answered:

Uniformly accelerated motion, 17; inclined plane, 3; coefficient of friction, 3; Boyle's law, 5; comparison of masses by acceleration test, 8; elastic impact, 4; surface tension, 5; linear expansion, 14; increase in gas pressure at constant volume, 7; increase in gas volume at constant pressure, 13; efficiency of hot-air engine, 4; specific heat, 6; heat of fusion of ice, 10; heat of vaporization, 13; heat of combustion of gas, 4; efficiency of a gas engine, 6; efficiency of a water motor, 7; efficiency of a steam engine, 8; velocity of sound in open air, 4; wave-length of sound by resonance, 5; number of vibrations of a tuning-fork, 11; index of refraction of water, 3; spectrum phenomena, 4.

Question 5. Of those who answered this question 115 use toys, and 76 do not use them. The toys used are:

Balloon, soap-bubbles, tops, tumble jack, wind-mills, Cartesian diver, loop-the-loop, marbles, water wheels, pumps, hydraulic ram, sling-shot, steam and gas engines, motors, dynamos, telegraph, whistles, horns, flutes, color tops, kaleidoscope.

Question 6. The returns from this question concerning the criterion for judging a laboratory experiment are hard to tabulate. Few votes were received for the criteria as suggested in the first circular. Many votes were cast for a combination of two or more, and in these cases a vote was counted for each. The wording was also changed by the voters. The best summary of the vote seems to be this:

One hundred and eighty believe that an experiment should illustrate an important principle of physics; 130 think it should also help to fix in mind a principle that is in practical use; and 96 think that it should in addition interest and arouse the curiosity of the student; 52 are opposed to the use of toy machines, and 41 think it an admirable idea to use them.

Other suggestions as to what a laboratory experiment should aim to do were sent in as follows:

It should emphasize the basis of scientific work (20), so that the learner realizes that he is studying things rather than statements (6). It should give a better understanding of a principle (15) and help to fix it in mind (21). It should tend to develop independent thinking (18), power to reason (19), self-reliance (5), and accuracy of expression (14). It should foster skill in accuracy of observation (19), manipulation (22), and methods of experimentation (6). It should be simple (25), should verify something learned in the class (11), should be suggestive of further experiments (10), and should bring in incidentally phenomena not directly the subject of the experiment (10). It should raise the ideals of the value of careful, accurate, painstaking work (15), and be related to a principle in which the student can see some use (11).

Perhaps these statements, when viewed collectively, may be taken to mean that the laboratory is the place to impress the learner with the value, the meaning, and the methods of truly scientific work. He should learn that good results are obtained in any work only when the conclusions are based on careful, accurate, and unbiased observation, and are drawn with fearless honesty and entire fairness. He should also see that such conclusions are but close approximations, so that he is ever ready to change or improve them when it is found to be necessary to do so.

Question 7. This question as to what is necessary in order to make physics more nearly fill the place it is capable of taking as a valuable educative factor, has called forth the largest number of suggestions of any. We regret much that we have not the means of printing extracts from many of the answers received. We have tried to include most of the ideas put forth in the following synopsis, though many of the finer distinctions of meaning have been necessarily lost:

Physics should be closely co-ordinated with the daily life and experiences of the students (55). This should not only be done by making the practical applications prominent (40), by bringing the work into close contact with industrial operations (8), by visiting industrial plants (8); but should also lead us to make the problems simple, concrete, and dealing with phenomena familiar to the student, (16), and even to found the discussions on the common experiences of the students rather than on the laboratory apparatus (14). In any case, the value of the principle under consideration must be evident to the student (14), and he must be given a clear understanding of the essential points involved (6). We must give less theoretical and abstract work, and a greater number of applications of the theory that is given (20).

In addition to co-ordination with industrial operations and practical applica-

tions of physics, it should be correlated with the universe, by showing that the principles seem to be operative throughout our entire range of observations from the cosmos to the electron (14). We should dwell more on the principles of wide application (15), and have less detail and fewer special cases (6), i. e., should teach fewer things well (14), and make the work less scattering (4). If the subject-matter is not reduced, we should have more time in which to treat it (25). This should be accomplished by requiring a descriptive course in advance of the present course (6), or by extending the work done into the grades (4).

We should lay far greater stress on the observation and study of phenomena as such (35), and pay very much less attention to the numerical relations between portions of phenomena. (48). This means less emphasis on the mathematical and abstract side (30), less quantitative work in the laboratory (33), more demonstration work (12), more class work, questioning, and quizz (7). Some do not agree with this position; they claim that we need more accurate quantitative work (4), better preparation in the elementary mathematics (7), better apparatus (13), and larger equipment (9). Conditions would be much improved if there was a text that had less subject-matter (12), that was inspiring and full of life and human sympathy (7); that was perfectly clear (4), that presented the subject as a consecutive or unified argument (7), and showed how one principle is related to others (15). In like manner, the manual should not make automatons of the student (3), and every experiment should exhibit "something doing," i. e., be active and dynamic rather than static (5). Fifteen express the opinion that all laboratory work should be quantitative, 15 call for simpler apparatus for this work, and 34 believe that there should also be qualitative work done by the students.

In the laboratory work there should be more supervision (7), the experiments should follow the class work (11), and every experiment should have a definite and clearly stated end in view (11).

There are three who believe that public opinion needs education concerning the value of laboratory work, and 3 others who think the lack of appreciation of school boards is to blame for our failings. It is also suggested that there are too many examinations, that the amount of work required in physics should be commensurate with that required in other subjects, that there should be a reward for concrete knowledge for those who are destitute of ability as abstract thinkers, and that physics should be required of all students with credit varying from $\frac{1}{2}$ to $1\frac{1}{2}$ units.

Others suggest that the essential thing is better-prepared teachers, i. e., from the teaching point of view (33). The teachers should in addition have common-sense (2), tact (3), greater interest in the work (4), and be enthusiastic (21), inspiring (10), sympathetic and natural (4). Other requirements of the teacher are that he be a trained physicist (8), that he have a comprehensive view of the subject (7), that he know more than there is in the text (7), that he keep informed of what is doing in the world by reading current scientific literature (4), and that he plan his work more carefully (4). He should take more personal interest

in the students (3), should be able to gain the confidence of the pupils and arouse their interest (3), and should not be teaching merely because he has to do so (3). He must also have imagination and try to understand the pupil's point of view (3), and he must do all this for $65 a month. Hence some suggest the need of better salaries for the teacher (4), less work for him (6), and a recognition of the fact that laboratory work and lecture demonstration work require vastly more preparation than ordinary class work. Others suggest that the teacher should be free to make up his own list of experiments (3), so that he could adapt the work to local conditions (4), and therefore he should pay no attention to college-entrance requirements (7), but rather should strive to meet the needs of the pupils who do not go to college (4). He should be required to take charge of small laboratory sections only (3), should make the work attractive through variety (9), and have it carefully graded. He should also be a member of some science teachers' association and take active part in its work (3).

Finally, and by far the most important, is the question of the method of presentation. That this should be accommodated to the mental states of children of fourteen to fifteen is suggested by 14, and will doubtless be agreed to by all. We should always begin with physics in the service of humanity, developing the concepts used from the everyday experiences, making it less abstract and more human (5); we chill the student's enthusiasm at the start by confronting him at once by a (to him) strange set of problems and concepts couched in a strange terminology (4). The student craves at that age the explanations that can be given only in the light of the greatest generalizations of science; yet these explanations must be applied to his immediate activities (3). Hence we should cling closely to the largest principles, and let him come to comprehend gradually their meaning and scope by constant application to his own experiences and problems (5). We should introduce vastly more historical and biographical matter (14), and should show the close bearing of science on the world's progress (7). We should lay greater emphasis on the method of thought used in scientific work, and less on the experimentation (9). We should give a careful presentation of each subject before any study of it is required (10), and give the demonstration experiments before the quantitative work is attacked (4). We must also cut out all college physics (7), get a better order of topics (3), co-ordinate the subject with the other subjects in the curriculum (9), and strive for clearer expression of the ideas and concepts (2).

In forming a judgment as to the meaning of this summary of the answers to question 7, the reader must remember that each answer contained only two or three of the suggestions, and that these two or three seemed to the sender to indicate the main causes for the shortcomings of physics teaching. It must then be evident that we are not yet as well agreed as we might be on this most important point. Perhaps the whole thing might be summed up by saying that

we teachers do not comprehend two things as clearly as we should; namely, (1) we fail to understand the nature and needs of the adolescent mind; and (2) we comprehend even less the real nature of science and the real meaning of her services to civilization.

Question 8. Comparatively few of the answers mentioned this question. Those that did notice it classed the experiments as those that teach principles that the average citizen should know, and those that interest the student. The vote was not sufficiently representative to tabulate with effect.

In conclusion, the committee wishes to thank heartily all those who so cordially responded to its request for information.

Since sending out the circular the committee has found that several other associations were considering either the same or a similar problem. Hence we have invited all associations known to be interested in the problem of defining the physics unit, and of getting a satisfactory syllabus for it, to join in the movement and appoint committees to co-operate in carrying the enterprise to a successful and thoroughly representative conclusion. This circular is sent out by the undersigned committees by joint action. If there are other associations which would like to join in this work, we shall be glad to hear from them. It is the plan of the joint committees to work out a new syllabus and submit it to the physics teachers of the country next fall. In order to help these committees to frame such a syllabus, any one interested is invited to send answers to the following questions:

1. How can the drudgery of the notebook be reduced? Is the tabular form of notebook desirable? Should the pupil be required to work out his own form of report? Can you suggest a good minimum requirement for the notebook work?

2. How could the amount of subject-matter be reduced so that greater emphasis could be laid on method of thought and the development of reasoning power?

3. Should physics be placed in the fourth year of the course?

4. How much of the time of the course shall be required to be devoted to laboratory work?

5. Can you suggest any action that the associations could take that would tend to make the teacher of physics freer to develop his laboratory and lecture work more fully?

6. What sort of a syllabus could be devised that would leave the teacher free

to exercise his own initiative and yet guarantee that the student should do a unit of work?

7. What should be the aim of the physics course, and what means could be used to find out whether that aim had been accomplished by the work?

8. How can teachers be encouraged to join science teachers' associations and to take part in their work?

Answers should be sent, as before, to C. R. Mann, Ryerson Laboratory, University of Chicago. All teachers are urged to send answers to some of the questions, even if they do not care to answer them all. All answers should be in by August 1. This circular is being sent to all the physics teachers whose addresses are in the possession of the committees because of the great expansion of the work. The next circular, containing the tabulated results from this one and the suggested syllabus, will be sent only to those who are sufficiently interested in the work to answer this.

CENTRAL ASSOCIATION OF SCIENCE AND MATHEMATICS TEACHERS:

C. R. Mann, University of Chicago, Chicago, Ill.; *Chairman.*
C. H. Smith, Hyde Park High School, Chicago, Ill.
C. F. Adams, Central High School, Detroit, Mich.

NORTH CENTRAL ASSOCIATION OF COLLEGES AND SECONDARY SCHOOLS:

L. E. Ackley, State University, Vermillion, S. Dak.
C. F. Adams, Central High School, Detroit, Mich.
J. S. Almy, University of Nebraska, Lincoln, Nebr.
F. H. Ayres, Central High School, Kansas City, Mo.
A. D. Cole, State University, Columbus, Ohio.
J. Dewey, Columbia University, New York, N. Y.
H. M. Garrett, High School, Beatrice, Nebr.
C. W. Green, Albion College, Albion, Mich.
K. E. Guthe, State University, Iowa City, Iowa.
P. H. Hanus, Harvard University, Cambridge, Mass.
S. Hayes, High School, Lancaster, Ohio.
F. S. Jones, State University, Minneapolis, Minn.
C. R. Mann, University of Chicago, Chicago, Ill.; *Chairman.*
C. H. Smith, Hyde Park High School, Chicago, Ill.
E. F. Smith, Humboldt High School, St. Paul, Minn.
O. M. Stewart, State University, Columbia, Mo.
A. J. Stout, High School, Topeka, Kans.
H. L. Terry, State Inspector of Schools, Madison, Wis.
S. L. Thomas, High School, Council Bluffs, Iowa.
W. A. Thompson, High School, Webster, S. Dak.
G. W. Treat, Lawrence University, Appleton, Wis.
H. I. Woods, Washburn College, Topeka, Kans.

MICHIGAN SCHOOLMASTERS' CLUB:

C. F. Adams, Central High School, Detroit; *Chairman.*
H. N. Chute, High School, Ann Arbor.
C. W. Green, Albion College, Albion.

NEW YORK STATE SCIENCE TEACHERS' ASSOCIATION:

J. F. Woodhull, Teachers College, New York; *Chairman.*
O. C. Kenyon, High School, Syracuse.
J. S. Shearer, Cornell University, Ithaca.

THE AMERICAN PHYSICAL SOCIETY:

A. D. Cole, State University, Columbus, Ohio.
William Hallock, Columbia University, New York, N. Y.
C. R. Mann, University of Chicago, Chicago, Ill.; *Chairman.*
J. S. Shearer, Cornell University, Ithaca, N. Y.
O. M. Stewart, State University, Columbia, Mo.

NEW JERSEY STATE SCIENCE TEACHERS' ASSOCIATION:

H. M. Campbell, High School, Long Branch.
I. E. Kline, Blair Academy, Blairstown.
A. T. Seymour, High School, Orange; *Chairman.*
G. H. Trafton, High School, Passaic.

CHICAGO AND COOK COUNTY HIGH SCHOOL TEACHERS' ASSOCIATION:

E. E. Burns, Joseph Medill High School; *Chairman.*
C. M. Turton, South Chicago High School.
W. E. Tower, Englewood High School.

NEW YORK PHYSICS CLUB:

J. M. Jameson, Pratt Institute, Brooklyn; *Chairman.*
E. R. von Nardroff, Erasmus Hall High School, Brooklyn.
H. Newcomer, Wadleigh High School, New York.

MISSOURI SOCIETY OF TEACHERS OF MATHEMATICS AND SCIENCE:

F. H. Ayres, High School, Kansas City; *Chairman.*
O. M. Stewart, State University, Columbia.
J. S. Stokes, State Normal School, Kirksville.

[NOTE.—Just as this circular is going to press, attention has been called to an article in *Science* for May 18, by Professor J. W. A. Young, on "Recent Advances in Prussia in Teaching of Mathematics and the Natural Sciences." This article should be read by everyone interested in this problem since it contains a discussion of some of the work that has been done in Germany in the direction in which these circulars are tending. It has also been suggested, too late for incorporation in the circular, that it would be of great assistance in advancing this work in this country if each physics teacher would select such ideas from the summary of the answers to question 7 as appeal to him, and begin right away next fall making practical experiments with his classes, in order to find out in how far these ideas are capable of being wrought out efficiently in practice. The article on Germany should encourage us to begin this work immediately.]

EDITORIAL NOTES

The report of the Massachusetts Commission on Industrial and Technical Education is a highly important document. The relation of education to the welfare of the community, and the peculiar significance of industrial and technical education, are considered in so broad and fundamental a manner as to give the conclusions of the commission convincing force. While Massachusetts may be more particularly in need of certain kinds of technical education on account of its important manufacturing interests, the general principles of the report are vital to education everywhere in the country. We believe, therefore, that we can perform no better service to educators and legislators in all parts of the country than by reproducing here the essential features of the general report of the commission, for a copy of which we are indebted to the courtesy of President Carroll D. Wright, of Clark College, chairman of the commission.

The commission, consisting of Carroll D. Wright, chairman; Warren A. Reed, vice-chairman; John Golden, secretary; Mary Morton Kehew, George H. Martin, Nathaniel I. Bowditch, John P. Murphy, Simeon B. Chase, and George E. Keith, held several public hearings. As a result it records the following impressions as to the

ATTITUDE OF DIFFERENT CLASSES TOWARD THE SCHOOLS

"1. There is a widespread interest in the general subject of industrial education, or special training for vocation. This interest shows itself in two distinct forms, as manifested by two classes of people. There is, first, a general and theoretical interest, felt by students of social phenomena and by expert students of education; and, second, a more practical and specific interest, felt by manufacturers and wage-earners. Men and women who have been brought into intimate contact with the harder side of life, as it appears among the poorer people in the cities, who are grappling with the variety of problems of childhood to which city life gives rise, think they see in some form of industrial education a means of securing earlier and greater efficiency as wage-earners, more self-reliance and self-respect, steadier habits of industry and frugality, and through these the opening of avenues to better industrial and social conditions.

"The broader-minded students of education, men who look at their own work in the light of all its relations to society and to individuals, are coming more and more to feel that education is more than schooling of the old-fashioned type; and that for the fullest development of a child he must early and continuously be regarded as a member of the whole community, must be familiar with all its activities, and must be taught progressively to share in those activities, giving as well as receiving, producing as well as consuming, doing as well as learning.

They see that this sort of training is used in the education of the feeble-minded, in the reformation of wayward and vicious children at reform and truant schools, and that it is being used to elevate the colored race in the South; and they ask why it may not be equally efficient in stimulating and directing the higher orders of mind, in preventing as well as curing juvenile delinquency, and in improving the social conditions of white as well as black children.

"2. The hearings showed that, besides this general and theoretical interest, there is a practical and specific interest among manufacturers and wage-earners because of a *personal need*.

"The commission was told at almost every hearing that in many industries the processes of manufacture and construction are made more difficult and more expensive by a lack of skilled workmen. This lack is not chiefly a want of manual dexterity, though such a want is common, but a want of what may be called *industrial intelligence*. By this is meant mental power to see beyond the task which occupies the hands for the moment, to the operations which have preceded and to those which will follow it—power to take in the whole process, knowledge of materials, ideas of cost, ideas of organization, business sense, and a conscience which recognizes obligations. Such intelligence is always disconnected, not with its conditions, but with its own limitations, and is wise enough to see that the more it has to give, the more it will receive.

"Manufacturers confidently believe that a system of industrial education, wisely planned, would tend to develop such intelligence, while it increased technical skill.

"That large numbers among wage-earners have the same faith was shown to the commission by numerous representatives who testified before it, and by the statistics showing the number of men and women who are now availing themselves of existing opportunities. The numbers of workmen in the evening classes of the textile schools in this state; the experience of the Evening Trade School in Springfield, and of those of New York and Philadelphia; the large classes maintained by the Young Men's Christian Association; and the enormous number seeking to advance themselves through technical education in the correspondence schools (a number estimated at fifty-five thousand in Massachusetts)—these facts prove conclusively that the interest is real and vital.

"3. The commission was made aware of a growing feeling of inadequacy of the existing public-school system to meet fully the need of modern industrial and social conditions. The opinion was expressed by many speakers that the schools are too exclusively literary in their spirit, scope, and methods. Where there was not a pronounced opinion, there was a vague feeling of dissatisfaction with results. This does not imply hostility. Everywhere the commission found the people loyal to the purpose of the schools, and proud of the advanced position which the state has held, and they do not complain of the cost. They hesitate to criticise, and are far from desiring any revolutionary change; but they are inquiring with open minds whether some modifications may not be possible, by which the schools may

reach in a more practical way the great body of children and youth. This phase of the subject is discussed more at length in a later part of this report.

"4. The commission was not able to learn that even the people who are most interested in industrial education have any definite ideas as to its proper scope or method. One or two carefully considered plans were presented, and some practical suggestions were offered by Mr. Charles F. Warner, principal of the Technical High School in Springfield, whose communication is appended. With these exceptions, when the question was asked, 'Have you any plan to propose for meeting the need of which you speak?' the answer was, 'I have not thought so far,' or, 'I leave that for the commission to decide.'

"5. The commission early became aware that its purpose and work encountered the suspicion and hostility of many of the labor unions of the state. This was expressed by individual representatives, and was evidently due to misapprehension. It was suspected that the commission was created to formulate a plan for trade schools supported at public expense. The opposition to such schools is based on the fear that they would furnish workmen in numbers sufficiently large to effect the labor market, and bring about a lowering of wages. These schools are also opposed on the ground that they might furnish workmen ready to take the place of union men during the existence of a strike. 'Scab hatcheries' is the significant term by which such schools are characterized. To such schools the labor unions declare themselves totally and unalterably opposed.

"The objection urged by the unions is fully met by the closing paragraph of Sir William Mather's address:

> Please take notice of what I said about the avoidance of teaching a trade to the extent of causing a lad to say, after leaving the industrial school: "I am a printer," 'I am a cotton-spinner," "I am a mechanic or a carpenter." In the first place, it is detrimental to the lad's own interests. He becomes somewhat conceited before he has got through the proper training by actual practice. It tends to deterioration of skill and intelligence in trades, which can only be fully acquired through work done on a commercial scale. It will tend to discredit industrial education.

"6. To technical schools in distinction from trade schools the commission found little opposition. In fact, many of the union men expressed themselves heartily in favor of schools which would offer to men already engaged in industries the opportunity to broaden their knowledge of the principles of their trade. This would tend to increase the efficiency of the workers in a given trade, while the closed door was maintained against outsiders.

"At one or two of the hearings, individuals, while not opposed to technical education in this narrow sense, would not favor it, believing that American workmen are already sufficiently skilful and sufficiently intelligent. It was declared that they have nothing more to learn.

"7. To the question, 'If technical education were to be furnished, by whom should the expense be borne?' the most common answer was: 'Wholly or partly by the State.' There is a general feeling that the municipalities are already spending as much money as they can afford for educational purposes, and that

any new department in the direction of industrial education, which must be largely of an experimental nature, should be undertaken by the state, or at least with substantial assistance from the state."

This is followed by an admirable historical sketch of the

GROWTH OF OUR PRESENT SCHOOL SYSTEM AND ITS ISOLATION FROM INDUSTRIAL AND SOCIAL LIFE

"Industrial and technical education cannot be considered apart from the general system of education out of which it must grow, and of which, if it is to be successful, it must form an integral part.

"The original purpose of public education in Massachusetts was to fit its youth, through the learning afforded by schools, to be intelligent citizens.

"The supreme problems which presented themselves to the leaders in early Massachusetts history were intellectual problems—problems of church and state. To establish and develop a self-governing community, under the new conditions which confronted them, demanded intelligence of a high order and widely diffused. These men, themselves educated in the most advanced learning of the time, saw in the study of classic languages and mathematics a means of developing the power of concentrated and sustained thought, of clear and logical reasoning, and of balanced judgment. They believed that the study of the history and literature of the past tended to widen the horizon of thought, to bring to the solution of the problems of today the experiences of yesterday, so that successes and failures of other peoples in other times might serve as guides and warnings for people here and now. They called this a liberal education—an education that liberated, that freed from the bondage to narrow and local prejudice, and made the vision of life keen and far-sighted.

"Out of this purpose grew the colleges and the Latin schools, and for a similar purpose the universal common schools. This belief in the efficacy of learning, deeply rooted in the past, has never lost its hold upon the thought and the imagination of our people; so that the educational system based upon it, begun in poverty, has expanded with the means of the people until it commands the admiration of the world.

"Whenever public interest has seemed to wane, ardent reformers have appeared who have stimulated or shamed the people into new efforts. But from the beginning the purpose has remained unchanged—to promote intelligence as a basis of citizenship. The lavish expenditure upon common schools, high schools, and colleges has this for its chief aim.

"The schools had another, but wholly subordinate, function. Indirectly, they were expected to influence favorably all the callings in life. The more intelligent the person should become, the better workman he was likely to be—more thoughtful, more careful, more considerate, more provident, more inventive; so that the system of education through schools was likely to promote the material prosperity of the state. That is what the early lawmakers meant when they coupled 'learning and labor' as 'profitable to the commonwealth.'

"But the special training for vocations was provided for by another system—the system of apprenticeship, which included even the professions. Young men who would be lawyers or doctors or ministers learned the technique of their callings in the homes or the offices of older practitioners. Farming was learned by work on the farm, trades by work in the shops, and housekeeping in the home.

"The two systems did not conflict with each other. The master was bound by the terms of the indenture to keep his apprentice at school. So the two forms of training went on simultaneously for several generations, each effective in its way—general training through the schools, industrial training through apprenticeship. The child and the youth were never out of touch with the school life, so that there never came a time of abrupt transition. There was no chasm.

"The apprentice system is calculated for stationary conditions. It tends to conserve ancient traditions and methods, and cannot maintain itself in the face of change. Consequently and necessarily with the development of modern sci ence the old apprentice system waned and gradually disappeared.

"Special training for vocations took its place, first, in the professions in schools of theology, of medicine, and of law. The new idea was next applied to the preparation for teaching, and normal schools were established. The advent of railroads called for a new type of engineers, and technical schools were established. With the advent of the factory system, the introduction of machinery, the making of machines more and more automatic, the division and subdivision of labor, the apprentice system gave way in the trades and manufactures.

"While this change in the vocations was going on, another change was also in progress. The schools were gradually claiming more and more time. The school year was lengthened, school attendance was made compulsory, and the age limits were raised. Every day lost by the apprentice system was gained by the school, until, imperceptibly, under steady pressure, the school came to stand alone as the only means of training, and the child came to be almost wholly separated from the ordinary activities of life.

"In place of two systems of training, balancing each other and mutually co-operative, there came to be but one, absorbing all the time and thought and interest of the children and youth—a system of education isolated and one-sided.

"The effects of the giving-up of the apprentice system have all been aggravated by the congestion of population in cities. City life instead of rural life, life in tenements and flats instead of in houses, together with the increase of wealth, have combined to deprive great numbers of children of those opportunities for industrial activity which were inseparable from life on the farm. Well-to-do people are everywhere lamenting that there is nothing for their children to do. The children are always receiving and never giving. Food, clothing, shelter, education, amusement—all come to them as freely as the air and the sunshine.

"The effects of these changes, repeatedly brought to the attention of the commission, are not most serious where we might naturally expect—in a lack of manual efficiency, though that is marked, but on the intellectual and moral side. There is a one-sided sense of values, a one-sided view of life, and a wrong attitude toward

labor. Not having any share in productive labor, and being out of touch with it, the youth have no standards by which to measure time or possessions or pleasures in terms of cost. Many persons believe that about this point center some of the gravest of present-day social problems.

"Drawing and manual training have been introduced to supply some of these defects. But neither has been related closely to industry."

The result has been that drawing in the schools has become more and more extensively cultural in its purpose and method, and the original industrial purpose has been largely lost sight of. This probably accounts for the fact that, notwithstanding drawing was intended to stand for a distinct contribution to the industrial interests of the state, it is still classed by many flippant writers and talkers among "fads," "frills," and "fancies."

"The wide indifference to manual training as a school subject may be due to the narrow view which has prevailed among its chief advocates. It has been urged as a cultural subject mainly useful as a stimulus to other forms of intellectual effort—a sort of mustard relish, an appetizer—to be conducted without reference to any industrial end. It has been severed from real life as completely as have the other school activities. Thus it has come about that the overmastering influences of social traditions have brought into subjection both the drawing and the manual work."

PRESENT STATUS OF VOCATIONAL TRAINING

"All the callings in life for which children and youth need to be specially prepared may be roughly grouped into four classes—professional, commercial, productive, and domestic.

"Of these, the professional callings are sufficiently provided for, partly at public and partly at private expense. A large part of the burden of high-school maintenance is incurred in the interests of professional callings.

"The activities which may be classed as commercial, including all that have to do with the processes of distribution and exchange, are provided for largely at public expense. The schools send out salesmen, clerks, bookkeepers, typewriters, and stenographers in ever-increasing numbers. These are the occupations which allow clean hands and good clothes. If anything is lacking in this business training, it is special education in the principles and practice of expert salesmanship. A beginning of such instruction has been made in Boston.

"Turning to the occupations engaged in production, in distinction from distribution, we find that these are only touched educationally in their most advanced and scientific forms. No instruction whatever is furnished at public expense in the principles or practice of farming, dairying, gardening, and building trades, cabinet-making, machine-shop practice, boot- and shoe-making, tanning, printing, bookbinding, dressmaking, millinery, embroidery, design."

CONCLUSIONS

"1. As a result of the public hearings and the special investigations, the commission has arrived at the following conclusions:

"For the great majority of children who leave school to enter employments at the age of fourteen or fifteen, the first three or four years are practically waste years so far as the actual productive value of the child is concerned, and so far as increasing his industrial or productive efficiency. The employments upon which they enter demand so little intelligence and so little manual skill that they are not educative in any sense. For these children, many of whom now leave school from their own choice at the completion of the seventh grade, further school training of a practical character would be attractive and would be a possibility if it prepared for the industries. Hence any scheme of education which is to increase the child's productive efficiency must consider the child of fourteen.

"2. Children who continue in school until sixteen or eighteen, especially if they complete a high-school course, are able to enter upon employments of a higher grade, usually in mercantile pursuits, and they are able by reason of greater maturity and better mental training to learn the technic of their employment in a shorter time; but they are wholly lacking in manual skill and in what we have called industrial intelligence. For the purpose of training for efficiency in productive employments the added years which they spend in school are to a considerable extent lost years. In the cases of both classes of children the employment upon which they enter on leaving school is determined by chance.

"3. The productive industries of the state, including agriculture, manufactures, and building, depend mainly upon chance for recruiting their service. A few apprenticeships still exist in a few industries or parts of industries, and very few apprentices are indentured, and many so-called apprenticeships are falsely named. The knowledge and skill which the new men bring to the service of any industry is only what they have picked up in a haphazard way. Some bring much, and many bring little.

"4. This condition tends to increase the cost of production, to limit the output in quantity, and to lower the grade in quality. Industries so recruited cannot long compete with similar industries recruited from men who have been technically trained. In the long run that industry, wherever in the world it is located, which combines with general intelligence the broadest technical knowledge and the highest technical skill, will command the markets of the world.

"5. The industries of Massachusetts need, in addition to the general intelligence furnished by the public-school system and the skill gained in the narrow fields of subdivided labor, a broader training in the principles of the trades and a finer culture in taste as applied to material, workmanship, and design. Whatever may be the cost of such training, the failure to furnish it would in the end be more costly.

"6. The state needs a wider diffusion of industrial intelligence as a foundation for the highest technical success, and this can only be acquired in connection

with the general system of education into which it should enter as an integral part from the beginning. The latest philosophy of education reinforces the demands of productive industry by showing that that which fits a child best for his place in the world as a producer tends to his own highest development physically, intellectually, and morally.

"7. The investigation has shown the increasing necessity for a woman to enter the industrial world for the sake of self-support, and hence that she should be prepared to earn a respectable living wage, and at the same time that the attempt should be made to fit her so that she can and will enter those industries which are most closely allied to the home. The investigation has shown that that vocation in which all other vocations have their root, namely, the care of the home, has been overlooked in the modern system of education. In order that the industrial life of the community may be vigorous and progressive, the housekeepers need to be instructed in the laws of sanitation, in the purchase, preparation, and care of food, and in the care of children, that the home may be a home, and not merely a house."

RECOMMENDATIONS

"The commission does not deem it to be a part of its duty under the provisions of the resolve creating it, and in fact it is not in the power of a temporary commission, to formulate exhaustive and specific plans for industrial education, but rather to ascertain and exhibit the needs of such education and to point out how the state may make effective its existing policy, and to suggest means for the further industrial development of the state.

"There seem to be two lines in which industrial education may be developed—through the existing public-school system, and through independent industrial schools. In regard to the former, the commission recommends that cities and towns so modify the work in the elementary schools as to include for boys and girls instruction and practice in the elements of productive industry, including agriculture and the mechanic and domestic arts, and that this instruction be of such a character as to secure from it the highest cultural as well as the highest industrial value: and that the work in the high schools be modified so that the instruction in mathematics, the sciences, and drawing shall show the application and use of these subjects in industrial life, with especial reference to local industries, so that the students may see that these subjects are not designed primarily and solely for academic purposes, but that they may be utilized for the purposes of practical life. That is, algebra and geometry should be so taught in the public schools as to show their relations to construction; botany to horticulture and agriculture; chemistry to agriculture, manufactures, and domestic sciences; and drawing to every form of industry.

"The commission would also recommend that all towns and cities provide by new elective industrial courses in high schools instruction in the principles of agriculture, and the domestic and mechanic arts; that, in addition to day courses, cities and towns provide evening courses for persons already employed

in trades; and that provision be made for the instruction in part-time day classes of children between the ages of fourteen and eighteen years who may be employed during the remainder of the day, to the end that instruction in the principles and the practice of the arts may go on together.

"In regard to the second method of developing industrial education, and in view of the facts already stated and the conclusions reached by the commission, the commission submits for the consideration of the legislature the following draft of a bill as embodying its recommendations:

AN ACT TO PROVIDE FURTHER FOR INDUSTRIAL EDUCATION

Be it enacted, etc., as follows:

Section 1. The governor, by and with the consent of the council, shall appoint a commission of five persons, to be known as the Commission on Industrial Education, to serve for the term of five years and without pay. The said commission on its organization shall appoint a secretary to be its executive officer, who shall not be a member of the commission, and who shall receive an annual salary of $3,500; and the commission may employ supervisors, experts in industrial and technical education, and such clerical and other service as may be found necessary. The necessary expenses of the commission, including clerk hire, traveling expenses, stationery, and all other incidental expenses, shall be paid out of the treasury of the commonwealth, as may be provided by law.

Section 2. The Commission on Industrial Education shall be charged with the duty of extending the investigation of methods of industrial training and of local needs, and it shall advise and aid in the introduction of industrial education in the independent schools, as hereinafter provided; and it shall provide for lectures on the importance of industrial education and kindred subjects, and visit and report upon all special schools in which such education is carried on. It may initiate and superintend the establishment and maintenance of industrial schools for boys and girls in various centers of the state, with the co-operation and consent of the municipality involved or the municipalities constituent of any district to be formed by the union of towns and cities as hereinafter provided. The commission shall have all necessary powers in the conduct and maintenance of industrial schools, and money appropriated by the state and municipality for their maintenance shall be expended under its direction.

Section 3. All towns and cities may provide independent industrial schools for instruction in the principles of agriculture, and the domestic and mechanic arts, but attendance upon such schools of children under fourteen years of age shall not take the place of the attendance upon public schools as required by law. In addition to these industrial schools, towns and cities may provide for evening courses for persons already employed in trades, and they may also provide, in the industrial schools and evening schools herein authorized, for the instruction in part-time classes of children between the ages of fourteen and eighteen years who may be employed during the remainder of the day, to the end that instruction in the principles and the practice of the arts may go on together; provided, that the independent schools authorized in this section shall be approved as to location, courses, and methods of instruction by the commission on industrial education.

Section 4. Two or more cities or towns may unite as a district for the maintenance of the industrial schools provided in the preceding section, but no such district shall be created without the approval of the Commission on Industrial Education.

Section 5. Whenever any city or town or any district, as provided in the preceding section, shall appropriate money for the establishment and equipment and maintenance of independent schools for industrial training, or shall institute new day or evening industrial courses in high or manual-training schools, the state, in order to aid in the maintenance of such schools or new industrial courses, shall pay annually from the treasury to such towns, cities, or districts providing industrial courses a sum proportionate to the amount raised by local taxation and expended for the support of schools for each thousand dollars of valuation as follows: towns and cities expending more than five dollars for each thousand of valuation for the support of public schools to be reimbursed by the state to the amount of one-half, those raising and expending between four and five dollars per thousand to an amount of one-third, and those raising and expending less than four dollars per thousand to an amount of one-fifth of the cost of maintaining industrial courses or industrial schools; provided, that no payment to any town or city shall be made except by special appropriation of the Legislature.

Section 6. The Commission on Industrial Education shall make a report annually to the legislature relative to the condition and progress of industrial education during the year, what industrial schools have been established and the appropriations necessary for their maintenance, in accordance with the preceding section, and such other recommendations as the Commission on Industrial Education may deem advisable; and especially shall the commission consider and report at an early day upon the advisability of establishing one or more secondary technical schools for boys and girls; providing for a three- or four-years' course for extended training in working principles of the larger industries of the state.

Section 7. The trustees of the Massachusetts Agricultural College are hereby authorized to establish a normal department for the purpose of giving instruction in the elements of agriculture to persons desiring to teach such elements in the public schools, as provided in secs. 3 and 4; provided, that the cost of such department shall not exceed the sum of $5,000 in any one year, and that at least fifteen candidates present themselves for such instruction.

Section 8. Sec. 10 of chap. 42 of the *Revised Laws* of the commonwealth, and all acts and parts of acts inconsistent with this act, are hereby repealed.

"The commission recognizes that there should be no interference with the public-school system as it exists by a separate authority having co-ordinate powers with those of the board of education, yet it believes that the elements of industrial training, agriculture, domestic and mechanical sciences, should be taught in the public schools, and, as already stated, that there should be, in addition to this elementary teaching, distinctive industrial schools separated entirely from the public-school system. The foregoing recommendations, together with the bill embodying the views of the commission as to separate industrial schools, solves this problem.

"Instructions in public, elementary, and high schools would naturally and logically lead to the entrance of students on the work of the independent industrial schools; and the Commission on Industrial Education, as recommended, would deal solely and entirely with such schools, thus abrogating the Act of 1872 (sec. 10 of chap. 42 of the *Revised Laws*), leaving the school authorities on their own initiative to introduce new industrial courses in the public schools. This avoids

conflict, and insures harmony and a development of the system of industrial training so much to be desired.

"The commission in its consideration has endeavored to preserve the integrity of the public-school system, to enrich it along industrial lines, and expand it along vocational lines through independent industrial schools. This seems necessary because the present public-school system is aimed primarily to secure cultural and not industrial or vocational effects, while the departure recommended by the commission relative to independent industrial schools secures a development of the principles of industrial instruction, and entirely in accordance with the policy to which the state is already fully committed through its support of normal schools, art schools, institutes of technology, and textile schools. The Act of 1872, except in the city of Springfield, has remained a dead letter, but the state aid provided by the foregoing plan would, the commission believes, induce other municipalities to enter upon a like beneficent experience.

"In order to secure proper instruction for teachers in the elements of agriculture, there seems to be a necessity for some normal department or separate normal school. The commission has considered two propositions: one to establish a normal school in the agricultural college, and another to establish a separate normal school. The agricultural college has the plant and all the facilities for giving instruction in the elements of agriculture to those desiring to become instructors in such elements. It has therefore been considered the wiser plan to recommend a normal department in the existing agricultural college, thus saving expense and avoiding the necessity of duplicating plants. It is undoubtedly a fact that some of the seniors in the agricultural college are qualified to give instruction, thus utilizing the facilities of the college.

"In conclusion, the commission is perfectly sensible of the fact that no comprehensive plan for securing industrial education can be created by the fiat of the legislature; such plan must be the result of practical experience, growing out of experiments. This is the aim in the foregoing report and recommendations.'

BOOKS OF THE YEAR FOR THE TEACHER'S LIBRARY

Among the responses to the request for suggestions from readers made in the March number of the *School Review* was the suggestion that a list of recent books likely to be of special value to the high-school teacher, and including something more than textbooks, be published from time to time in the *Review*, along with brief comments on the scope and quality of the books themselves. The idea seemed to be an admirable one. The following list has accordingly been prepared. It is hoped that it may be of some service to those who recommend books for the purchase of school and public libraries, as well as to teachers. The list is by no means exhaustive. Sins of omission will doubtless be conspicuous. Not so, it is hoped, those of commission.

No attempt at refined classification has been made. The list includes both books of interest to the special or departmental teacher, and books which can legitimately lay claim to a wider circle of readers; it includes textbooks and books of deeper and more abiding human interest.

The editors take pleasure in acknowledging their indebtedness for many of the titles, and not a few of the critical comments, to members of various departments of the University of Chicago. To their prompt and cordial responses to a circular letter asking for information regarding recent books of note much of whatever value the list may have is due.

GENERAL EDUCATION, PHILOSOPHY, AND PSYCHOLOGY

Psychology. By James R. Angell. New York: Henry Holt.

This book has rapidly become a standard textbook in psychology. The comprehensiveness of the book, its thoroughly modern spirit, its attractive literary style, its frequent applications of psychology to problems of education and to the study of mental development, combine to make it a book of unusual interest to teachers as well as to special students of the subject.

A Text-Book in the History of Education. By Paul Monroe. New York: The Macmillan Co.

The best single book now available on the history of education.

Elements of Dynamic Psychology. By E. L. Thorndike. New York: A. G. Seiler.

Principles of Teaching. By E. L. Thorndike. New York: A. G. Seiler.

The Educational Process. By W. C. Bagley.

See the review of this book by Professor Dexter in the present number of the *School Review.*

Dynamic Factors in Education. By M. V. O'Shea. New York: The Macmillan Co.

See the review of this book by Dr. King, in the present number of the *School Review.*

Education and the Larger Life. By C. H. Henderson. Boston: Houghton, Mifflin & Co. $1.25.

The Children of Good Fortune. By H. C. Henderson. Boston: Houghton, Mifflin & Co.

Moral Education. By E. H. Griggs. New York: B. W. Huebsch. $1.50.

Memories of a Great Schoolmaster. By James P. Conover. Boston: Houghton, Mifflin & Co. $1.50.

This book contains interesting personal reminiscences of Dr. Henry A. Coit, rector for nearly forty years of St. Paul's School at Concord, N. H.

The Problems of Philosophy. By Harald Höffding. New York: The Macmillan Co.

The Life of Reason. In Five Books: I, Reason in Common Sense; II, Reason in Society; III, Reason in Religion; IV, Reason in Art; V, Reason in Science. By George Santayana. New York: Charles Scribner's Sons. Each volume $1.25.

A significant and stimulating discussion of fundamental problems of philosophy, both because of the range and breadth of the work, and because of its fine literary quality.

HISTORY

An Introductory History of England: From Earliest Times to Close of Middle Age. With Maps. By C. R. L. Fletcher. London: John Murray. Pp. xvii + 397.

A book written to make English History intelligible and interesting to young people. Older people may read it with real profit. Of course, there are some things we should like to see different, and yet all in all we know of nothing more fascinating in style or satisfactory in treatment of this kind.

The Political History of England from 1216–1377. By T. F. Tout. New York: Longmans, Green & Co. Pp. xxiv + 406.

Covers a period that has been left pretty much in obscurity by modern writers.

The Political History of England from 1066–1216. By George Burton Adams. New York: Longmans, Green & Co.

History of Modern England. By Herbert Paul. New York: The Macmillan Co. Four volumes already published.

Irish History and the Irish Question. By Goldwin Smith. New York: McClure, Phillips & Co.

Recollections. By William O'Brien. New York: The Macmillan Co.

History of Political Theories from Luther to Montesquieu. 2 vols. By W. A. Dunning. New York: The Macmillan Co.

What is History. By K. Lamprecht. New York: The Macmillan Co. $1.

Russia and Its Crisis. By Paul Milyoukov. University of Chicago Press. Pp. xiv+588. $3.

The most authoritative and comprehensive account of Russian past development and present condition available in English.

The Trail Makers. New York: Barnes.

A series of inexpensive reprints of original materials for western history; journal of Lewis and Clark, etc.

Journal of the Continental Congress, 1774-1776 *et seq.* Reprinted by the Library of Congress, Washington.

These scarce volumes are now made accessible.

The Monroe Doctrine. By T. B. Edgington. Boston: Little, Brown & Co.

Collections of documents forming a complete history.

History of the United States. By H. W. Elson. New York: The Macmillan Co.

Best single volume on the subject; 900 pages, brought to date.

High School History of the United States. By Johnston and MacDonald. New York: Henry Holt.

The old excellent Johnston brought to date and forming a good text.

School History of the United States. By W. H. Mace. Chicago: Rand McNally & Co.

A well-balanced text, remarkable for its interest and life.

The Declaration of Independence: Its History. By John H. Hazleton. New York: Dodd, Mead & Co.

Complete and authoritative history.

Americans of 1776. By James Schouler. New York: Dodd, Mead & Co.

Unique, social study of the Revolutionary period: dress, recreation, press, education, clubs, salary, etc.

The Old North-West Leaflets. Chicago and Boston: Atkinson, Mentzer & Grover. Each 5 cents, $4 per hundred.

No. 1. *The Last Two Journeys of Father Marquette* (1673–1675). From the *Jesuit Relations.* With Introduction and Notes by Edwin Erle Sparks.

No. 2. *Manners and Customs of the Western Indians.* From the *Jesuit Relations.* In press.

These leaflets have been compiled by the Chicago History Teachers' Association, and will contain extracts from original sources pertaining to the history of the Middle West.

CIVICS AND SOCIOLOGY

National Administration. By John A. Fairlie. New York: The Macmillan Co.

City Government in the United States. By Frank J. Goodnow. New York: The Century Co.

American Judiciary. By Simon E. Baldwin. New York: The Century Co.

The American City. By Delos F. Wilcox. New York: The Macmillan Co.

Territories and Dependencies in the United States. By W. F. Willoughby. New York: The Century Co.

The City: The Hope of Democracy. By Frederic C. Howe. Charles Scribner's Sons. $1.50.

General Sociology. By Albion W. Small. University of Chicago Press. Pp. xiv+739. $4.

This book has been well described as a campaign document as well as a manual. It presents the claim of sociology to be considered as a valid and comprehensive science.

A Decade of Civic Development. By Charles Zueblin. University of Chicago Press. Pp. 200. $1.25.

This book gives a concise and spirited account of certain definite measures (political, economic, social, and artistic) for the betterment of American cities. It treats of the training of the citizen, the making of the city, and the recent improvements in the cities where most has been done. A stimulating and optimistic study. See review of this book by Dean Nathaniel Butler in the January number of the *School Review*.

Poverty: A Definition of Poverty and an Estimation of its Extent at the Present Time in the United States. By Robert Hunter. New York: The Macmillan Co. $1.50.

The Bitter Cry of the Children. By John Spargo. New York: The Macmillan Co. $1.50.

The Social Ideals of Alfred Tennyson as Related to His Time. By William C. Gordon. University of Chicago Press.

Man and the Earth. By N. S. Shaler. Fox, Duffield & Co. Pp. 240. $1.50.

ENGLISH

The Question of Our Speech. By Henry James. Boston: Houghton, Mifflin & Co. $1. net.

On Ten Plays of Shakespeare. By Stopford Brooke. New York: Henry Holt & Co.

Sidney Lanier. By Edward Mims. Boston: Houghton, Mifflin & Co.

The Life of Charles Lamb. By E. V. Lucas. New York: G. P. Putnam's Sons. 2 vols. $6.

Part of a Man's Life. By Thomas Wentworth Higginson. Boston: Houghton Mifflin & Co. $2.50.

LATIN

The Classics and Modern Training. By Sidney G. Ashmore. New York: G. P. Putnam's Sons. $1.35.

One of the most interesting of the essays included in this book is "A Plea for the Classics in Our Schools, with Particular Reference to Latin." This essay may be procured from the publishers separately, and should be read by every Latin teacher.

Ancient Legends of Roman History. By Ettore Pais. Translated into English by Mario E. Cosenza. New York: Dodd, Mead & Co. $4 net.

This book consists of a number of studies, the aim of which is to establish the legendary character of much of the so-called history of regal and early republican Rome.

The Religion of Numa. By Jesse Benedict Carter. New York: The Macmillan Co. $1.

This contains a series of essays which throw light upon different epochs in the history of Roman religion.

Studies in Virgil. By T. R. Glover. London: Arnold.

A sympathetic study of some of the literary aspects of Virgil's work.

Roman Society from Nero to Marcus Aurelius. By Samuel Dill. London: New York: The Macmillan Co. $4.

A well-written account of the different elements in the Roman society of the period.

The Private Life of the Romans. By H. W. Johnston. Chicago: Scott, Foresman & Co. $1.50.

The best systematic treatise on this subject in English.

A History of Rome During the Later Republic and Early Principate. Vol. I, From the Tribunate of Tiberius Gracchus to the second Consulship of Marius. New York: E. P. Dutton & Co.

An interesting account of an important period in Roman history.

FRENCH AND GERMAN

Introductory French Prose Composition. By Victor E. François. New York: American Book Co.

Advanced French Composition. By V. E. François. New York: American Book Co.

Elementary French Composition. By Jules Lazare. Boston: Ginn & Co.

Contes et nouvelles. First Series. By Jules Lazare. Boston: Ginn & Co

Beginner's French. By V. E. François. New York: American Book Co.

Longer French Poems. With an Introductory Treatise on French Versification. By T. Atkinson Jenkins. New York: Appleton & Co.

Elements of Phonetics: English, French, and German. Translated by W. Rippmann from Vietor's *Kleine Phonetik.* J. M. Dent & Co.

Méthode pratique, physiologique et comparée de prononciation française. By Zund-Burquet. Paris: Gymnase de la Voix.

Dictionnaire phonétique de la langue française. By Michaelis and Passy.

Uniform International Dictionaries: French-English and English-French. By P. Passy and G. Hempl.

Collection of French Idioms, Sayings, and Proverbs, with Their English Equivalents and Meanings. Containing about 50,000 phrases. By A. G. Billaudeau. New York: G. E. Stechert.

Manuel phonétique du français parlé. By Kr. Nyrop. Paris: Picard & Fils

Précis de Prononciation française. By Rousselot and Laclotte. Paris: H. Welter.

A History of French Versification. By L. E. Kastner. Oxford: Clarendon Press.

For any information concerning the above list of French books apply to the editors of the *School Review*, who will forward letters to the examiner of the Department of French.

The Teaching of Modern Languages. By Leopold Bahlsen.

See the review of this book by Professor Paul O. Kern in the February number of the *School Review*.

The Life of Goethe. By Albert Bielschowsky. Translated by William A. Cooper. 3 vols. Each $3.50.

A definitive Goethe biography.

GENERAL SCIENCE

Science and Hypothesis. By H. Poincaré. New York: The Macmillan Co.

The Romance of Modern Invention. By A. Williams. 4th ed. London: Pearson. $1.50.

The Romance of Modern Engineering. By A. Williams. London: Pearson. $1.50.

The Romance of Modern Locomotion. By A. Williams. London: Pearson. $1.50.

The Preparation of the Child for Science. By M. E. Boole. Oxford: Clarendon Press. $0.50.

The New Knowledge. By Duncan. New York: A. S. Barnes. $2.

BIOLOGY

Plant Relations—Plant Structures. By John M. Coulter. New York: D. Appleton & Co.

Foundations of Botany—Elements of Botany. By Joseph Y. Bergen. Boston: Ginn & Co.

Guide to the Study of Common Plants: An Introduction to Botany. By Volney M. Spalding. Boston: D. C. Heath & Co.

Botany all the Year Round. (For use in the South.) By E. F. Andrews. New York: American Book Co.

Nature Study: One Hundred Lessons about Plants. By David Worth Dennis. Marion, Ind.: O. W. Ford & Co.

Lessons with Plants. By L. H. Bailey. New York: The Macmillan Co.

Elementary Botany—College Botany. By George Francis Atkinson. New York: Henry Holt & Co.

Outlines of Botany. By R. L. Leavitt. New York: American Book Co.

The Teaching of Biology in the Secondary School. By Francis E. Lloyd and Maurice A. Bigelow. New York: Longmans, Green & Co.

The Teaching Botanist. By William F. Ganong. New York: The Macmillan Co.

Methods in Plant Histology. By Charles J. Chamberlain. University of Chicago Press. Pp. x+262. $2.25 net.

While intended for college classes, the book will be of great assistance to high-school teachers. "Microchemical tests, free-hand sectioning, the use of the microscope, and the securing of reproduction stages in the simpler forms of plant-life receive particular attention in the new edition."

New Creations in Plant Life. By W. S. Harwood. New York: The Macmillan Co.

This book gives a very complete account of the life and work of Mr. Luther Burbank, whose remarkable experimental work with plants is of scientific as well as of high practical value.

PHYSIOGRAPHY AND GEOLOGY

A Text-Book in General Geology. 3 vols. By T. C. Chamberlin and R. D. Salisbury. New York: Henry Holt & Co.

The first volume, on "Geologic Processes and Their Results," is especially valuable to secondary-school teachers.

Structural and Field Geology. By James Geikie.

An excellent book that will prove valuable to students attempting field-work in geology without an instructor.

Elements of General Geology. By W. H. Norton. Boston: Ginn & Co. $1.40.

A new textbook for high schools, well illustrated and wisely arranged.

PHYSICS AND CHEMISTRY

Physics. By C. R. Mann and G. R. Twiss. Chicago: Scott, Foresman & Co. Pp. 456. $1.25.

Waves and Ripples in Water, Air, and Ether. By J. A. Fleming. London and New York: Young.

Becquerel Rays and Properties of Radium. By Strutt. London: Arnold.

Popular, scientific—excellent.

Electricity and Matter. By J. J. Thomson. New York: Charles Scribner's Sons.

A First Course in Physics. By R. A. Millikan and H. G. Gale. Boston: Ginn & Co.

List of Laboratory Experiment in Elementary Physics. By R. A. Millikan and H. G. Gale. Boston: Ginn & Co.

The Teaching of Chemistry and Physics. By Alexander Smith and Edwin H. Hall.

Recent Developments of Physical Theory. By W. D. R. Whetham. London. $4.

The Modern Theory of Physical Phenomena. By A. Righi. New York: The Macmillan Co. $1.

Light-Waves and Their Uses. By Albert A. Michelson. University of Chicago Press. Pp. 176. $2 net.

A series of popular and interesting lectures delivered at Lowell Institute, with numerous practical applications of recent theories.

Introduction and General Inorganic Chemistry. By Alexander Smith. New York : Century Co. $2.25.

Shows how recent advances of theoretical chemistry may be used to explain chemical facts, and contains paragraphs especially intended for teachers.

Conversations on Chemistry. By Wilhelm Ostwald. Authorized Translation by E. C. Ramsay. John Wiley.

Very suggestive to teachers.

Physical Chemistry in the Service of the Sciences. By Jacobus H. van't Hoff. Translated by Alexander Smith. University of Chicago Press. $1.50.

Gives a clear idea of the far-reaching results of recent discoveries in physical chemistry.

Chemical Society (London), *Annual Reports.* Vol. I (1904), Vol. II (1905). London: Guiney & Jackson.

Give clear accounts of the chief real advances in the sciences.

Introduction to Astronomy. By F. R. Moulton. New York: The Macmillan Co.

This book contains a popular account of the recent work of Chamberlin and Moulton upon the nebular hypothesis, and theories of evolution of the solar system.

Laboratory Astronomy. By R. W. Willson. Boston: Ginn & Co.

MATHEMATICS

The Pedagogy of Mathematics. By J. W. A. Young. New York: Longmans, Green & Co.

BOOK REVIEWS

Commercial Geography. By HENRY GANNETT, CARL L. GARRISON, AND EDWIN J. HOUSTON. New York: American Book Co., 1905. Pp. vi+416+30.

The latest textbook in commercial geography comes to us from the hands of three well-known scholars, each strong in his field. Mr. Gannett, the official geographer of the United States government, has had many years of experience and most excellent training in actual mapping and in the geographic presentation of statistical material in the various government publications. To this he has added contributions of a high order of merit in various cyclopedias and other works. The other collaborators have had ample experience in other lines, the one as a teacher and supervisor of teaching, and the other as teacher and worker in a special field.

The plan of presentation followed does not differ materially from the half-dozen recent American texts in commercial geography. Part I treats of commercial conditions; Part II, of commercial products; and Part III, of commercial countries. This arrangement is logical and defensible. It is borrowed bodily from Chisholm, though American authors do not generally acknowledge it. Mr. Chisholm was free to use an octavo page, and to expand his presentation to over 600 pages, thus making it possible to give an adequate discussion of some topics and of some countries. When the first serious attempt was made to provide a textbook in commercial geography in America, the author took Chisholm as his model. He succeeded in mentioning nearly every condition and commodity that Chisholm had given. And he performed the wizard feat of condensing it into a well-leaded and margined duodecimo page, and cutting the number of pages down to 500. In spite of the condensation, the book was well written and carefully edited, and, answering a pressing want, it met with instant success. The possession of a text made it much easier to establish courses in the subject, and interest has grown rapidly. Then came the insidious ambition and influence of the rival publishing house and selling agent. Here is a successful book which must be met upon its own ground. The prescription which has won success must be followed without reservation. Every principle, and commodity, and place, and map, and illustration mentioned in the successful book must be duplicated, and the size and price of the book must be kept in the same class with the successful attempt. Thus the new author is left almost no option in style or matter, or method of treatment. This is a serious handicap. It has been imposed over and over again in the history of schoolbook-making in America. Our common-school geography has suffered from it from the year one. Here concentration has been carried to such an extreme that almost every bit of juice has been squeezed out of the matter presented, leaving dry facts, lists of things, and tables of statistics, almost as void of interest in some cases as a spelling-book, or at best a pocket dictionary. Such stuff is hard to read, and harder to remember, and, if memorized, is as likely to produce mental indigestion as healthy growth. This salesman's ideal in book-making is a form of repressive conservatism, stunting and damaging in its influence upon the subject presented.

As I scan this latest text in commercial geography, it is again the salesman's finger I see writing on the wall. It is Chisholm in the American condensed form over again. The prescription is accurately filled. The subjects are all there, and the countries

too, and something is predicated of every one; though it reduces cement, for example, to six lines, with never a hint of its great significance in our industrial life.

One of the faults of this generous inclusiveness is the difficulty in the logical distribution of emphasis. For example, ginger and mustard occupy as much space as silver, and zinc two and a half times as much.

Some errors have crept in. It is not true that southern slopes are chosen for orchards in the United States and Canada, as stated on p. 9. It is tautology to say "Desert of Sahara," p. 20. Metamorphic rocks are not restricted to those of aqueous origin, as implied on p. 21. The last paragraph on p. 29 should be reconstructed so as to show that it is a *species*, not *an animal*, that changes in the new realm. Why say "metallic" ores (p. 46)? On p. 104 it would appear that ramie and China grass are different plants. It would be interesting to know what kind of "rails" are made from paper pulp (p. 119). The most of our quinine comes from Ceylon and India, regions that are not in the category of "to some extent also" (p. 123). *Are* all the cattle slaughtered for food in this country inspected by the government (see p. 126)? On p. 142 it reads as though "a sponge" were "an animal." The same page tells us that the cochineal lives on trees. On p. 221 we read: "It will be noticed how inevitably the large cities become railroad centers"—a duplicate, so far as new lands are concerned, of the little girl's observation that the large rivers always flow past the big cities. On p. 223 we learn that it is because corn is "bulky" it is mainly fed to live stock.

But this is criticism enough. There many more errors, due to oversight doubtless, inevitable in a first edition, many of which are plainly due to haste or carelessness in proofreading.

The graphs of percentage of production ought to be challenged. Absolute quantities have been purposely omitted. We see at glance that the United States produces about 25 per cent. of the world's lead, about 37 per cent. of the steel, and about 75 per cent. of the corn. But there is never a hint of how these commodities compare with each other. Such a comparison is quite as instructive as the rank of states. It is true, values could be derived from a table in the appendix, but we know that as a rule it will not be done. Statistics, too, ought to be dated. There is scarcely a date in the book.

The maps are, as a rule, well drawn, and are provided in generous measure. A very excellent index is provided. The typography and mechanical execution of the book are admirable.

J. PAUL GOODE.

UNIVERSITY OF CHICAGO.

School History of the United States. By HENRY WILLIAM ELSON. New York: The Macmillan Co., 1906. Pp. xxviii+467.

The Making of the American Nation. By JACQUES WARDLAW REDWAY, F.R.G.S. New York: Silver, Burdett & Co., 1905. Pp. x+420+56.

There seems to be no limit to the production of textbooks on American history for use in grammar schools, in spite of the fact that no more books of this type are needed at present. Enterprising publishers, however, will doubtless continue to encourage the mania for changing textbooks every year or two, so that we must expect still further additions, which will do little more than to give a slightly different version of the old, old story.

Mr. Elson acknowledges that there "are various excellent school histories now in use," but thinks that the faults of the old histories, which were "written with such mathematical precision as to render them dry and insipid," still need further correction. The aim, then, is to tell the story so as to arouse interest. That this text will accomplish its end any better than numerous others on the market remains to be seen. Evidence is wanting to convince the reviewer that this will be the case. The "usual 'helps,' questions, and topics for discussion, have been omitted, on the supposition that an intelligent teacher can do this better than the writer, and that he prefers to do it." The treatment of topics, and the space allotted to the principal subjects are such as one usually finds in books of this description, and call for no special comment. The book is well illustrated, and the maps are satisfactory. There is no index—an omission that should not have occurred.

Mr. Redway's reason for writing his book is that we may have a textbook adapted to the needs of today. He thinks that "political history may be broadly summed up as a quantitative expression of temperature, rainfall, and surface features," and that the eloquence of statesmen in legislative halls has done little or nothing, so far as our own history is concerned, in making "the political fabric of the nation what it is today." There is little evidence, however, of the application of these principles in the text, and the chapters and topics read very much the same as other texts for grammar schools. Chapters 15 and 20 do enlarge somewhat on the usual treatment of questions of economic importance, but they hardly fulfil the promises made. The author is satisfied to refer to whole volumes of McMaster's, Scribner's and Schouler's histories of the United States, for collateral reading, and never gives references with any more detail than whole chapters of the works mentioned.

These two books are typical of the large number of texts with which the market is flooded. In general it may be said that they are good books, and will probably prove satisfactory to the average teacher and pupil. The main criticism is that the subject-matter is presented in practically the same manner as in other texts. It is useless to continue to multiply books of the same general type. Unless an author is quite sure that he can produce a text that will really fill a widespread need, and will be something more than another version of our history told according to the plan usually adopted, he had better indefinitely postpone the attempt to add to the present supply.

MARCUS W. JERNEGAN.

UNIVERSITY OF CHICAGO.

Dynamic Factors in Education. By M. V. O'SHEA. New York: The Macmillan Co., 1906. Pp. xiii+320.

This work discusses in some detail the motor and energic factors involved in education. The author first emphasizes the great activity characteristic of the little child, its lack of inhibition, and the relation of the development of inhibition to mental development. It is pointed out, also, that it is on the basis of this multiplicity of activities that education builds, and that an education which does not primarily aim to give proper expression to them or to utilize them is apt to degenerate into mere verbalism. The discussion of the manual activities in education is particularly helpful. The reasons for manual training in the schools are reduced to what seems to be a thoroughly scientific basis. In fact, the whole treatment of the subject is sane and lacking in the type of reasons which modern psychological experimentation has shown to be untenable.

There are especially interesting chapters on the various aspects of the development of complex co-ordinated activities. The difficulty of acquiring new adjustments by merely seeing them in others is pointed out with many illustrations. "Do everything you can to aid the learner in gaining just the right motor experience," is the author's final word regarding the most economical method of teaching new co-ordinations, whether of arms, fingers, or vocal organs.

Under the heading of "The Energic Factor in Education" the question of fatigue in the school is taken up; the different ways by which it has been measured, tests, mental and physical, are discussed, and their limitations are clearly pointed out. Attention is called to the great individual difference in children in the manner of expending nervous energy. Some children are said to have leaky nervous systems, others are characterized as thrifty in the expenditure of their nerve force. Schoolroom procedures which are wasteful and those which are economical of nervous force are helpfully discussed. Among practices of the former type he includes all excessively fine work, certain varieties of postures in sitting, all kinds of noise, etc. The practical deductions from these facts find expression in a chapter on how to avoid waste in the arrangement of the daily program, etc.

Suggestive questions and topics for discussion are found at the close of each chapter, and at the close of the volume are a good bibliography and an index. The mechanical part of the book is particularly satisfactory, the binding being firm and yet entirely flexible, and the topics of the paragraphs being indicated in bold-faced type on the open margins of the pages.

The author is to be commended for his fresh and instructive discussion of well-known topics, and especially for the abundance of new illustration which he has gathered both by his own observation and from the recent literature. On the whole, we know of no more satisfactory discussion of what is thus far known of the evolution of motor control, its relation to education, and of the place of the manual arts in education.

IRVING KING.

PRATT INSTITUTE,
Brooklyn, N. Y.

A Course in Practical Mathematics. By F. M. SAXELBY. London and New York, 1905. Pp. viii+438.

The agitation in favor of closer relation between mathematics and the concrete practical side of life, which has been stirring up mathematical circles in England for some years past, and which is in essence a manifestation of a fundamental tendency of the times that can be seen effectively at work in Germany, France, and to some extent in America, as well as in England, has called forth a host of textbooks entitled "Practical Mathematics," or some similar phrase, and intended to give tangible shape, from the classroom point of view, to the ideas that are being presented in the theoretic discussions. These books have usually fallen within the secondary field; the work before us is of collegiate grade, and aims to extend to the field of collegiate mathematics, including the calculus, the experimental methods that are now finding such favor in England, especially in the field of elementary geometry and algebra.

To this end, experimental approximation and graphic methods are freely used, constant appeal is made to the intuition, and the exercises are usually taken from the other sciences, and from the technical subjects. The logical proof is regarded rather as the climax of the work than as its foundation. Thus both differentiation and

integration are preceded by chapters treating the subject by means of particular examples handled by graphic, arithmetic, and intuitional methods.

As to subject-matter, the work is distributed as follows: logarithms and plane trigonometry, pp. 1–47; use of formulæ, and miscellaneous equations and identities (variation, mensurational formulæ, linear and quadratic equations, partial fractions), pp. 48–77; plotting of functions, pp. 78–126; determination of laws from experimental data, mean values, pp. 127–69; differentiation, and applications, pp. 170–233; indefinite and definite integrals, pp. 234–75; vector algebra, pp. 276–308; solid co-ordinate geometry and applications, pp. 309–61; partial differentiation, miscellaneous methods of integration, some partial differential equations of applied physics, pp. 362–95; examination papers, answers, tables, pp. 396–438.

The work is well written and well illustrated. The figures and tabular matter are large and clear; but the type used is too small and decidedly trying to the eye in protracted use. True, the book is already quite large, and an appreciable increase in the size of the type would make it bulky; but considerable space could be gained by reducing quite materially the scale of the figures, and setting the tabular matter in more condensed form.

The work is well suited for use as text in courses in calculus conducted with the purpose of laying dominating stress on graphic, computational, experimental, approximative treatment; and all teachers of calculus will find in this book a rich fund of exercises which can be drawn upon for practical problems in connection with any introductory course in the subject.

J. W. A. YOUNG.

UNIVERSITY OF CHICAGO.

Lessons in English. By FRED N. SCOTT AND GORDON A. SOUTHWORTH. Boston: Benj. H. Sanborn & Co. Book I, pp. 238; Book II, pp. 371.

Lessons in English is a two-book course in English for the elementary school. With the considerable variation in the English courses of the schools in mind, the authors announce in their preface that Book I may be used for two or three years within Grades III–VI, and that Book II provides systematic lessons in grammar and composition for the three higher grades. The aims are stated to be to create a liking for good literature, to help children to talk and write more freely, to make them more and more observing, to make correct expression habitual, and to place before the student an orderly and intelligible statement of the principles that determine the structure of words and sentences.

The authors of these books are well known by their previous work in the field of English, and the reader finds, as might be expected, many familiar features and devices. Among these are the emphasis upon oral language, the use of models for inductive study, the comparison of pictures, and the suggestive leading question. The emphasis upon letter-writing is wisely placed, and the exercises for practice in composing letters and business forms are very ingenious and practical. There is also a gratifying recognition of the natural interests of children; the practice called for will, for the most part, arouse the willing activity of the learner. The attempt to maintain a balance of literary English and good current speech is to be commended.

Book I is, on the whole, more sound and attractive than Book II. The analytic order of treatment has been adopted in the grammar, it is true, but the arrangement of the lessons could be improved. There are far too many sections. The main topics do not stand out, and, therefore, the pupil is likely to be somewhat bewildered

and unable "to see the woods for the trees." It is unfortunate, moreover, to begin a series of lessons in composition with studies in capitals and follow with the choice of words. The analytical order should have been adhered to in the composition as well as in the grammar. Book II contains also some very loose phraseology, which ought to be corrected in a second edition. It is certainly taking great liberty to speak, for example, of the subjunctive mode as representing only "thoughts," as the authors do on p. 157.

Nevertheless, when all reservation is made, *Lessons in English* is one of the best of the numerous series of language books now on the market. The "wise and capable teacher" for whom it is designed will indeed find it a "friend, guide, and helper." Such a teacher will know how to subordinate the textbook in language to the actual needs of her particular class. In the case of teachers not so wise and capable it is much better that a good text in language should be followed, than that unsystematic and irrational, not to say spasmodic, "language lessons" should be inflicted upon long-suffering childhood.

JAMES F. HOSIC.

CHICAGO NORMAL SCHOOL.

The Industrial History of the United States, for High Schools and Colleges. By KATHARINE COMAN. New York and London: The Macmillan Co., 1905. Pp. xviii+343+xxiv.

This book braves the dangers of the pioneer, and thus has an assured value, however sharply it may be criticised. The lines of its conception, too, are broad and bold, but are not fully matched by firmness in execution.

It is designed to serve two masters, the high school and the college. In the necessary compromise resulting, it is the high school that has suffered. The language employed is very far from simple. The ordinary high-school student, as he is found, will often have to use a glossary for words not at all technical, but merely unusual. Technical words and terms are constantly used without explanation, as "quit-rent," "fee simple," "piedmont," Scotch-Irish," "minimum valuation." The style has the same characteristic lack of clearness, being sketchy and having lacunæ which keep the best-informed busy supplying the text. Brevity, that is, is obtained rather by literary shorthand than by discrimination. In the opinion of the reviewer, this work would be useful in high school only for the teacher.

These are not so fatal objections to its use for college work, and its value there will depend rather on its general internal excellence. Here its weakness is of another kind. In spite of the novelty of title and the unusual appearance of the table of contents, there is in fact much less deviation from the ordinary history of the United States than one would expect. Some topics are excluded, some are expanded; in general emphasis is placed upon economic happenings and motives; but few unfamiliar topics are introduced, nor is their arrangement strikingly novel. The importance of this criticism depends upon the use intended for the book: if it were to be made the basis of a separate course, there would be much wasteful repetition; if it be made the basis for additional work in a course in general American history, the similarity of treatment would be advantageous.

In general, the discussions of manufacturing and its problems are good, particularly that for the federalist régime. Commerce recieves its due share of attention, and the treatment is satisfactory considering the mass and variety of data involved. The whole question of land distribution in both colonial and later periods is very inade-

quately handled, and the same is true of the whole westward movement. The surface facts are presented, but not the underlying motive forces.

The number of facts stated is unusually large, and naturally errors, many of them of an excusable character, are not absent. The Pilgrims agreed with their partners in 1627 for £1,800, not £18,000 (p. 27); 500,000 is too high a figure for the Scotch-Irish immigration 1730 to 1770 (p. 58); "divisions" certainly did not weaken England in the Revolutionary War, as much as they did the colonies, and to compare the relative force of the two without mentioning France, cannot be a matter of judgment, it must be an error (p. 104); etc. The illustrations are interesting and of value, but the dateless maps of pp. 17 and 29 are true of no date, and some of the others are without sufficient explanatory notes.

CARL RUSSELL FISH.

UNIVERSITY OF WISCONSIN.

Essentials in American History. By ALBERT BUSHNELL HART. New York, Cincinnati, and Chicago: The American Book Co., 1905. Pp, xlviii + 584.

Our first scholars have lately seriously undertaken, with gratifying results, to supply our schools with satisfactory textbooks in general American history. A book by Professor Hart will naturally be welcomed as an addition to the list, and the briefest examination convinces that this will stand, as the reputation of the author would lead one to expect, with the best two or three. In the opinion of the reviewer, no one of these first-rate books can be described as first, but selection should be made from among them in accordance with special need and circumstance.

Professor Hart has written with the avowed purpose of meeting the needs created by the Committee of Seven—a textbook for the fourth year in high school. The special title "Essentials" seems a little invidious. It is to be presumed that all writers of textbooks aim to give the essentials, and Professor Hart would certainly be the last to claim that he had reached the ultimate essential. Still this title is not without meaning, for it indicates the author's purpose to exclude all which does not directly contribute to what he considers the one essential fact of our history—the upbuilding of the American nation.

It is precisely in the part where this unity of purpose has led to the greatest originality of treatment, that the book seems least satisfactory. Brevity in treatment for the colonial period is, indeed, desirable at this stage of the pupil's career, but two facts should stand out distinctly: first, the character of the colonists, both those qualities which they brought to America and those which they developed; second, the grouping of the colonists, by influence of origin and physiography, into great and diverse sections, which have formed the basis of our political history. These essential facts seem to have been lost sight of, in an arbitrary attempt to make all the colonies quick-step together. The loss is particularly apparent when the Civil War so suddenly divides an apparently united and uniform commonwealth.

With this exception, the book is a joy to the historian, because of its balance and proportion, the sure treatment of cause and effect, and the soundness of its scholarship. While only use can prove it so, it may be confidently predicted that it will prove equally a joy to the teacher. The style is a little close packed with fact, but is clear, intelligible, and quaintly inlaid with quotations from the sources. The illustrations are numerous, sound, and interesting. The maps are pertinent and plain. The teachers' apparatus is carefully worked out, and should be of constant use; there is an introductory note from the author to the teacher; at the end of the chapters there are really suggestive

topics, and references to suit the equipment of any library; at the end of the book, a list of books for a school library, a bibliography, some documents and valuable statistics, and a capital index. CARL RUSSELL FISH.

UNIVERSITY OF WISCONSIN.

The Geography of Commerce and Industry. By W. F. ROCHELEAU. Boston: Educational Publishing Co., 1905. Pp. vi+408; maps and illustrations.

This volume is planned for use in the eighth grade, a field in which there are not many competitors. The aim is a laudable one, and the author is to be congratulated on his point of view. The volume is divided into three parts: I, "Conditions Relating to Industries;" II, "The United States," in which type products and industries are treated in separate chapters (244 pages); and III, "Commerce of Foreign Nations," with regions as chapters (143 pages).

This topical plan of presentation, and a judicious leaving out of topics, is a move in the right direction. There is material enough given on a topic to arouse thought; at least this is true for the topics in the second part. For example, wheat gets 14 pages; corn gets 9; livestock, 10; cotton, 8; forests, 12; iron, 8; mineral fuels, 12; and so on. And the manner of presentation is well adapted to the pupils for whom it is intended.

Errors there are, of course; what first edition was ever free from them? For example (p. 15), "corn thrives with less moisture than wheat or oats." "We seldom find corn planted beside a stream, or wheat on a dry knoll." And this fling at our New England forefathers (pp. 18, 19): "As a result *no one becomes skilful* in any occupation. This was the case with the early settlers of New England." And the statement (p. 37) which seems to say that the oil-field of western Pennsylvania extends across Ohio into Indiana. On p. 49 we find the form "Hudson's Bay." On p. 63 we find this statement, which will not bear scrutiny: "Since the plant [corn] absorbs a large quantity of moisture from the atmosphere, it often thrives in localities where the rainfall is not sufficient for the best results in raising wheat, oats, and other small grain." And again corn and wheat seem to get mixed up in the paragraph beginning at the bottom of p. 63.

When these slips, and many more like them, have been removed, as they may be, by a more careful editing, the volume remains a very valuable contribution to the study of the commercial phase of geography in the eighth grade. It is a pity that the volume could not be given a better quality of paper and press-work. The diagrams could be more neatly constructed, and supplied with a scale so comparisons could be read quantitatively. A series of "chalk-modeled" maps of the continents is appended to the volume, but the value of chalk-modeling on the scale of the continent is open to question. An outline map with a few contours, tinted to show lowlands and highlands, has a much higher teaching value. J. PAUL GOODE.

UNIVERSITY OF CHICAGO.

The Educative Process. By WILLIAM CHANDLER BAGLEY. New York: The Macmillan Co. Pp. xix+358. $1.25.

Dr. Bagley aims in this book to cover "the field commonly included under the terms 'General Method,' 'Method of Recitation,' 'Theory of Practice,' etc." The book is not a review of what others have said upon these subjects, but is rather an attempt to set forth in outline a new statement of the general theory of education from

the standpoint of modern biology, psychology, and sociology. These sciences have slowly, but surely, compelled a new formulation of educational theory, and what has been especially needed for some time is just such a work as Dr. Bagley has written. We have an abundance of special discussions of particular phases of education, and it is, of course, through these studies that progress must be made. But if we are to keep the proper prospective of the field, we must have now and then a new unification of accumulated material. Such a need is felt especially by young teachers who are just beginning their professional studies, and it is to them that the author has addressed himself. Education is defined by Dr. Bagley "as the process by means of which the individual acquires experiences that will function in rendering more efficient future action." The function of the school is to control in a measure the experiences of the child during the plastic period of infancy. The principle underlying the selection of experiences by the school will be determined by the general aim of education, and this, according to the author, is social efficiency. Unless the school fits its pupils for their immediate future, it cannot justify its existence. This brief statement of the author's point of view, with the title of the parts into which he has divided his discussion, will give perhaps a more definite idea of the character of the work. In Parts II, III, and IV there is a psychological discussion of the following subjects: the acquisition of experience, the functioning of experience, the organization and recalling of experience. In Part V there is a very suggestive discussion of values, and in Part VI a somewhat detailed treatment of the technique of teaching. It will be understood, of course, that in a work covering such a broad field as this there is no time for an exhaustive discussion of controverted questions. The author has not been tempted away from his main purpose to the exploitation of any pet theory, but is at all times conservative. Where his reasoning is founded upon a scientific basis, he has kept well within the facts that are generally accepted by reputable scientists. It will be generally agreed that Dr. Bagley has given us here a sound and scholarly statement of educational theory.

EDWIN G. DEXTER.

SCHOOL OF EDUCATION,
University of Illinois.

First Year in Algebra. By FREDERICK H. SOMERVILLE. New York: American Book Co., 1905. Pp. 208.

The aim of this book is to provide an introductory course as a foundation to elementary algebra, and it covers the ground usually covered in such a book. It is intended either for the grammar or for the high school, but seems intended mainly for the former. The chapter on "Substitution" is of especial merit in its application to formulæ used in the higher grades of work. The author defers consideration of the equation until chap. 6. This seems unfortunate, for it overlooks the motive which should, in the nature of the case, be brought to the attention of the pupil. That is to say, the pupil faces the study of algebra in a sane, practical way when he comes to realize that it is a more powerful instrument than arithmetic for the solution of problems, and when he feels the need of such an instrument.

The early introduction of the equation would also impress on the pupil at the beginning that the symbol is a general number, and not, as the author supposes, and apparently tries to impress upon the pupil, an abbreviation for something concrete. In case the pupil has laid the right foundation in arithmetic, he will readily grasp the thought that $7A+5A+3A=15A$, just as he has known that 7 3's+5 3's+3 3's=15 3's.

The author constantly endeavors to make a close correlation between algebra and arithmetic, not only in the order of the presentation of the subject, but also in the method of treatment. Thus, the algebraic symbols are constantly referred to as quantities, and the sum of $7A$, $5A$, and $3A$ as $15A$ is explained by the sum of 7 apples, 5 apples, and 3 apples. This presents a false notion at the outset, and distinctly lowers the mental quality of the pupil's attitude toward the subject. Moreover, this constant relation of the subject to arithmetic causes the pupil to derive his algebraic images from arithmetic instead of from previous work in algebra.

By referring to the symbols of numbers as quantities the author introduces confusion into the solution of problems. For instance, in one model solution x equals the present age of the sister, and in another x equals the number of yards in each lot. In the first instance x equals a quantity, and in the second x equals a number. The result of this is to encourge slovenly thinking on the part of the pupils in their solution of problems.

In conclusion, it may be stated that, while the problems are well chosen and graded, the author has not been fortunate in the method of the introduction and development of algebraic principles.

A. F. AMES.

PUBLIC SCHOOLS,
Riverside, Ill.

American History in Literature. Compiled by MARTHA A. L. LANE AND MABEL HILL. Boston: Ginn & Co., 1905. Pp. x + 178.

Outline of United States History. By MAUD ELMA KINGSLEY. Boston: The Palmer Co., 1906. Pp. 48.

The first of these two books attempts to provide in compact form widely scattered specimens of literature which illustrate American history. It is for children of ten and twelve years of age, and a second book for the higher grades is promised. There are eight chapters, containing sixty-three extracts, which treat of such topics as "Columbus," "The Pilgrim Fathers," "The Acadians, "Washington's Inaugural Journey," "Old Ironsides," "Daniel Webster," "The Blue and the Gray," and "Liquid Air." This is an useful and interesting book, and should be in the hands of all teachers who have pupils of this age. Care must be taken, however, to see that a wrong impression is not left in the minds of pupils. The danger of pupils of this age is the tendency they have to accept as historical fact whatever is seen in print. Some of the selections are so imaginative that they had better have been omitted.

The second book is a syllabus and interpretation of our history. In each important period, or division of the subject, the principal events that should be studied are mentioned; then there are notes on the character of the period, and finally topics for written work. Plans for treating campaigns, and tables with summaries of certain topics, are given. The book seems to be intended for the use of teachers and pupils in the grammar graades, and ought to prove useful for the purposes intended.

MARCUS W. JERNEGAN.

UNIVERSITY OF CHICAGO.

Civics, Studies in American Citizenship. By WALDO H. SHERMAN. New York: The Macmillan Co., 1905. Pp. viii+328. $0.90.

The aim of the author of this book, "to teach and inspire civic patriotism" by bringing students "face to face with citizenship problems," is a worthy one. However,

in this case a commendable plan has been greatly marred by a general carelessness of statement, and in many instances by positive error. The printer is probably responsible for the statement (p. 8) that the Czar of Russia "abrogates" unto himself all the powers of government, but the assertion (p. 23) that "the United States has ruled out from naturalization *and citizenship* the Chinese," and (p. 143) that "the Constitution of the United States is the supreme law of the land," cannot be accounted for in that way. It sounds well to say (p. 143) that the Constitution of the United States "is the government's written explanation of itself," but it is not true. Finally, to mention only one other among the many serious defects, it may be pointed out that the treatment (p. 170) of the federal civil service and the President's appointing power is very misleading, On the whole, the book would prove an unreliable text in the hands of students. It should be of some value to teachers by reason of the suggestions in the second part in regard to the method of study and the teaching of civics.

A. R. HATTON.

UNIVERSITY OF CHICAGO.

Laboratory and Field Exercises in Physical Geography. By GILBERT H. TRAFTON, M.S. New York: Ginn & Co., 1905. Pp. 90.

Mr. Trafton has contributed a series of rational laboratory exercises for physical geography. Each exercise has an educational value in it for the student. There is a conspicuous absence of useless copying of maps and data from text books to notebooks. Such work will keep the students busy during the laboratory period, but should be condemned by all sane teachers of the subject.

Chapter 1 contains seven exercises based on the study of "The World as a Globe." Chapter 2 includes thirty-seven exercises associated with the study of "The Land." Of these exercises, four are introductory to the study of topographic and hachure maps, twenty-eight are based on the study of topographic maps, one on the study of minerals, one on the study of rocks, and three on field-work. Chapter 3 contains thirteen exercises associated with the study of "The Atmosphere;" they are simple, practicable, and very commendable. Chapter 4 includes three exercises based on the study of "The Ocean." In the appendixes there are suggestions to teachers, and lists of books and material valuable in physical geography work.

The studies of topographic maps and the exercises associated with the study of the air are especially good. The book does not include more than can and should be done in a high-school course in physical geography or physiography.

WALLACE W. ATWOOD.

UNIVERSITY OF CHICAGO.

The Art Reader. By P. E. QUINN. Boston: A. W. Elson & Co., 1905.

In the words of the publisher, this is not a textbook, but is, what its name implies, a reader that may be opened at random and read with pleasure and profit. From the pyramids of Egypt to St. Gaudens' Lincoln is, indeed, a wide range. In the fifty or more very excellent illustrations the reader is introduced to certain typical masterpieces. In the selection of his material the author evidently intended to stimulate interest through suggestive sketches, rather than to fill in a complete picture. The work is to be commended in that it is free from the weak sentimentality of some art readers. It would seem to be best adapted to the interests and abilities of the student in the first and second years of high school. A knowledge of historic facts is not to be mistaken for appreciation of the æsthetic and artistic qualities of the art facts of

any period. This book, and others which attempt to familiarize the student with the facts of art history, are to be regarded as adjuncts of history, of which the first vital knowledge is gained through the study of its monuments.

A book such as this has, therefore, a real educational value. This value is not to be mistaken, however, for æsthetic and artistic training. The book which organizes he art of the world in such a way that the young student is able to derive from it working tools for the development of his own powers of appreciation is yet to be written.

LILLIAN S. CUSHMAN.

UNIVERSITY OF CHICAGO.

The Elements of Business Law. By ERNEST W. HUFFCUT, Dean of the Cornell University College of Law. Boston: Ginn & Co. Pp. 329. $1.

A satisfactory elementary book upon business law is hard to find. Elementary books are always the most difficult to make, and business law has no sharply defined boundaries. Most of the books upon this subject are too general and indefinite to be of much prcatical use; some are so condensed and hard as to be not only uninviting, but to appear to be merely a string of abstract propositions having no relation to actual affairs. This book of Professor Huffcut's avoids both of these faults and is unusually good. It is written by a trained lawyer and successful teacher, who appreciates the needs of students and who knows how to meet them. The legal principles are stated clearly as well as concisely, and there are constant illustrations drawn largely from actual cases. The result is a book of good proportion, packed full of important matter, attractively and interestingly set forth. The keen critic may at times think that further qualifications might well be put upon certain statements, but no serious errors have been discovered. Searching and suggestive review questions are appended to each chapter. The mechanical execution is excellent.

FLOYD R. MECHEM.

UNIVERSITY OF CHICAGO.

BOOKS RECEIVED

HISTORY AND CIVICS

Outline of United States History. By MAUD ELMA KINGSLEY. Boston: The Palmer Co., 1906. Pp. 48.

Readings in European History: A Collection of Extracts from the Sources Chosen with the Purpose of Illustrating the Progress of Culture in Western Europe since the German Invasions. By JAMES HARVEY ROBINSON. Abridged Edition. In 1 vol. Boston: Ginn & Co., 1906. Pp. xxxiv+573.

Zur Geschichte: Proben von Darstellungen aus der deutschen Geschichte für Schule und Haus. Ausgewählt und erläutert von WILH. SCHEEL. Leipzig: B. G. Teubner, 1906. Pp. 174. M. 1.20.

American Hero Stories. By EVA MARCH TAPPAN. Boston: Houghton, Mifflin & Co., 1906. Pp. vi+265.